SYRIA
Agricultural Sector Assessment

Volume 3
Agricultural Production Annex

U.S. Department of Agriculture
in cooperation with the
U.S. Agency for International Development
and the
State Planning Commission
Syrian Arab Republic

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Syria: Agricultural Sector Assessment

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PREFACE

As one of five volumes comprising the Final Report of the Agricultural Sector Assessment, this Annex contains the technical reports which relate to the agricultural production process. The reports on land use and on crop and livestock trends, including area response predictive equations, were prepared as part of a contract between the U.S. Department of Agriculture (USDA) and the Comprehensive Resource Inventory and Evaluation System (CRIES) project. The CRIES project staff is constituted of personnel from the Soil Conservation Service, the Science and Education Administration, and the Economics, Statistics and Cooperatives Service of the USDA, and personnel from the Remote Sensing Project, Department of Resource Development, and Department of Agricultural Economics of Michigan State University. The other reports were prepared by USDA consultants. Names of specialists are listed in the prefaces of the various Chapters.

Preliminary drafts of the technical reports were provided to the State Planning Commission (SPC) in September and October 1979. Revised drafts were reviewed by Committees established by the Prime Minister's Office in early 1980. The comments and corrections of these Committees are incorporated to the extent possible into this Final Report.

The Syrian Agricultural Sector Assessment Project was carried out by the Office of International Cooperation and Development, USDA, in cooperation with the U.S. Agency for International Development and the Syrian Arab Republic under PIO/T 276-005-2-80020. The participation of the Syrian Arab Republic was provided through the State Planning Commission of the Prime Minister's Office, under the general direction of Hisham Akhrass, Deputy Minister of State for Planning Affairs, SPC.

(Continued)

The Syrian Agricultural Sector Assessment Project was implemented under the supervision of the resident project staff which included: USDA - William A. Faught, Team Leader and Co-Director; Wendell M. McMillan, Policy Economist; and Calvin C. Boykin, Jr., Production Economist; and SPC - Said Halabi, Co-Director; and Nour Barmada, Assistant Co-Director, who was succeeded during the last six months by Raghad Sheik El-Ard. A complete listing of the many specialists and counterparts who participated in the project are listed in the Appendix to Volume 1.

The Final Report of the Agricultural Sector Assessment contains the following five volumes:

Volume 1 - Summary Report

Volume 2 - Natural Resources Annex

Volume 3 - Agricultural Production Annex

Volume 4 - Agricultural Marketing Annex

Volume 5 - Human Resources and Agricultural Insititutions Annex

June 1980

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CHAPTER I

LAND USE PATTERNS

Based on the work of

the CRIES project

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PREFACE

This first chapter of the Agricultural Production Annex examines the patterns and intensity of land use in Syria. It contains much of the information developed by the Comprehensive Resource Inventory and Evaluation System (CRIES) project staff on these aspects of the agricultural sector assessment. The statistical data presented in this chapter, however, are primarily of a summary nature, and the detailed data tables upon which they are based are located in the technical files of the sector assessment project.

The CRIES work was undertaken by Daniel E. Kugler and James B. Johnson, with assistance from Larry M. Boone, Mark J. Cochran, and John W. Putman, all of CRIES project staff. Computer programs development was led by Weldon Lodwick of the CRIES project staff and the Department of Resource Development, Michigan State University, with assistance from Mark Simon, Jaime Cordera, Julia Miller and James Calme.

Hamed Safadi, Head of the Agricultural Statistics Division, and Fouad Kardouss, Head of the Utilization Division, Ministry of Agriculture and Agrarian Reform, collaborated in assembling information and assuring accuracy and usefulness of data used for agricultural resource planning activities. Additional assistance was provided by Farouk Othman and Faress Sowaff, Division of Agricultural Statistics, MAAR, and by Nour Barmada and Khalid Ubery, State Planning Commission.

LAND USE PATTERNS

A. Introduction

Assessment of the potentials for increasing future agricultural production in Syria must take into account, and build upon, the recent and current uses being made of the nation's land resources. This chapter examines both the general land use patterns, as well as the crop use of irrigated and non-irrigated land, over the 1975-77 period at the National, Mohafaza and Mantika levels. In addition, the extent to which agricultural land is being use for crop production is assessed through the application of land use intensity ratios.

The remainder of this introductory section outlines the definitions of the various land use classifications and the sources of data. The general methodology used in the computer processing of these data is given in Appendix 1.

Definitions and Data Sources

The following definitions have been used to classify the general land use statistics published by the Syrian government:

1. Forest: Land covered by natural forest trees or afforested by man.

2. Steppes and Pasture: Land covered with natural or man-established pasture and grass, including gardens, public squares and public permitted pasture land.

3. Uncultivable Land: Lands which cannot be cultivated.

    a. Buildings and public roads
    b. Marshes, lakes, rivers
    c. Rocky and sandy land

4. Cultivable Land: Land which can be cultivated and planted with trees or crops or fallowed.

    a. Cultivated: Land usually in agricultural rotation.

        i. perennial or seasonal crops
        ii. land fallowed for two years or less

b. Uncultivated: Land which can be cultivated if some form of land improvement precedes cultivation.

The major land use Cultivated Land is further broken down into the following three classifications:

1. Fallow: Land prepared for the next cropping season or land in a rotation and not cultivated for two years or less.

2. Crop: Land planted to various crops, classified as winter crops, summer crops and fruit trees, and divided as follows:

a. Irrigated: Agricultural land which has an uninterrupted water resource available for two agricultural years or land which may have a deficient water resource for no more than one season in no more than four years. This includes pumped and gravity fed irrigation.

b. Nonirrigated: Rainfed agricultural land planted to crops or fruit trees.

The land use classifications are additive as follows:

1. Rocks/Sand + Water + Buildings and Roads = Total non-agriculture

2. Not-cultivated + Cultivated = Total Cultivable

3. Forest + Steppes/Pasture + Total non-agriculture + Total Cultivable Land = Total Area

4. Irrigated Cultivated + Nonirrigated Cultivated + Fallow = Cultivated

The computer data tables are identified as follows:

Land Use Classification	Data Table Classification
Forest	Forest
Steppes and Pasture	Steppes and Pasture
Rocky and Sandy Land	Rocks and Sand
Marshes and Lakes	Water
Buildings and Public Roads	Buildings and Roads
Uncultivable Land	Total Nonagriculture
Cultivable Land	Total Cultivable Land
Cultivated	Cultivated
Uncultivated	Not Cultivated
Nonirrigated Cultivated	Nonirrigated Cultivated
Irrigated Cultivated	Irrigated Cultivated
Fallow	Fallow

The years 1975, 1976, and 1977 were chosen because they are the first consistent set of years using a new set of definitions, as established by the Supreme Agricultural Council in 1974.

The National level land use statistics for 1976 and 1977 were derived through the aggregation of Mantika level statistics provided by the Ministry of Agriculture and Agrarian Reform's (MAAR) Department of Statistics. In some cases National totals achieved through aggregation of Mantika data differs slightly from national totals available from other sources. However, it appears that National totals for the Syrian Arab Republic's general land use information are usually derived by aggregating Manatik to a Mohafaza total, then aggregating the Mohafazat to a National total.

Computer checking routines were used to ensure consistency of data for each Mantika. Mohafaza level land use totals for 1976 and 1977 were generated in a similar manner to the National totals. The National totals from aggregated Manatik were compared to the reported National totals and discrepancies removed.

Mantika level statistics were also provided by MAAR for 1975. These Manatik were aggregated to Mohafaza and National totals, then compared with totals reported in the Statistical Abstract and the Annual Agricultural Statistical Abstract. It is apparent that these statistics are either 1974 statistics or unadjusted 1975 statistics. Therefore, the Mantika level data for 1975 has been deleted and Mohafaz a level data from the two latter mentioned sources substituted.

The statistical data presented in the tables of this chapter are primarily of a summary nature. The detailed data tables upon which they are based are located in the technical files of the sector assessment project.

It should also be noted that some of the change in land use from year to year can be attributed to procedural change, i.e., changes that result from improvement in the collection, reporting and processing of information and statistics. This would include more accurate and complete enumeration of land use statistics, development of greater reliability in the application of the land use classification definitions by enumerators, and the refinement of the definitions to reflect actual conditions and practices more accurately. This assessment will not focus upon procedural change but simply cite its relevance when interpreting the statistical information.

B. General Land Use Patterns

The overall pattern of current land use can be seen in the tabulation below. As shown there, in 1977, Syria's cultivated land area was about 5,500 km^2, or about 30 percent of the country's total area of 18,520 km^2. About 8,500 km^2, or 46 percent of the total area, was classified as steppe and pasture, and about 450 km^2, or 2.4 percent, was forested. Most of the remaining area, about 18 percent of the total, was desert (rocks and sand).

Of the total cultivated area, about 70 percent or 3,867 km^2, was cropped, with the remaining 30 percent lying fallow. Irrigated land accounted for about 14 percent of the total cropped area, and 86 percent of cropped land was nonirrigated, or rainfed, land.

Major Land Uses 1/	1975	1976	1977
Total area	18,518	18,518	18,520
Forest	445	457	452
Steppe/pasture	8,631	8,549	8,535
Total cultivable land	5,955	5,882	5,863
Not cultivated	479	338	355
Cultivated land	5,475	5,544	5,509
of which: fallow	1,776	1,295	1,642
irrigated	516	547	531
nonirrigated	3,183	3,702	3,336
Total Nonagriculture	3,487	3,630	3,671
Rocks and sand	3,129	3,261	3,287
Water	98	100	106
Buildings and roads	260	269	278

1/ Data rounded to nearest 000 km^2 Source: Statistical Abstracts

Dynamic change in land use results from the movement of land between and among use classifications. These movements may result from changes in comparative advantage, applied technology, market forces, weather patterns, agricultural practices, policy, etc. Examples include afforestation projects converting steppe land to forest, irrigation projects converting some land uses to water and others to irrigated cultivated land, urbanization forcing

cultivated land into buildings and roads, or planning guidelines specifying cropland rotations and changed crop-fallow patterns. The pattern of these changes during the 1975-77 period are first examined at the national level, and then at the level of the Mohafaza and Mantika.

National Summary

At the national level from 1975-1977, the dominant change was a 183 km^2 increase in nonagricultural land to a total of 3,671 km^2. Compensating for this increase, two land classification decreased substantially: steppes and pasture land decreased 97 km^2 to 8,535 km^2 and cultivable land decreased 92 km^2 to 5,863 km^2. The rocks and sand component of nonagricultural land accounted for 158 km^2 of 183 km^2 increase. This probably illustrates a procedural change, the application of altered definitions gradually shifting land out of steppes and pasture and into rocks and sand. Dynamic change is best evidenced in the redirection of cultivable land. The advance of urbanization with its associated buildings and roads, the creation of new water impoundment projects1/, and the conversion of land by afforestation all may contribute to reducing cultivable land. It is also possible, as procedural change, that some cultivable land may have been more accurately reclassified as steppes and pasture.

Agricultural use of the land for the production of fruits and crops is best assessed within the components of cultivable land: not-cultivated land, and cultivated land. Cultivated land is further divided into three subclassifications: fallow land, irrigated cultivated land, and nonirrigated cultivated land. The decrease in cultivable land from 1975-1977 has been noted. The reasons for this decrease were probably both procedural and dynamic. Procedural change seems particularly evident from 1975-1976 in the very large decrease (-142 km^2) in not-cultivated land and the very large increase (+132 km^2) in the rocks and sand subclassification of nonagricultural land. With this exception taken into consideration, not-cultivated land has remained relatively stable at approximately 345 km^2. It appears that some land classified as noncultivated is brought into production during years of good rainfall. The latter effect may even be cyclic if the land were to require three agricultural seasons or more out of production (therefore not classified as fallow land) in order to build soil moisture. Analysis to examine the data for such a cyclic effect is limited by data availability.

Having noted noncultivated land response to rainfall and to rotations longer than allowable under the current definition of fallow land, some of the apparent dynamic change problems among fallow, irrigated, and nonirrigated lands within the cultivated land classification are explainable.

1/ Water projects tend to have a mixed project site specific dynamic effect on land use.

First, a very general overview of the agricultural season annual rainfall is pertinent. A preliminary examination of rainfall station data 2/ indicates that in general the best rainfall conditions for agricultural production were in 1975-76, followed by 1976-77, and conditions in 1974-75 were least favorable.

Using the rainfall data as a very simplistic key to major agricultural land use changes, the observation is that there is a large response in nonirrigated land to rainfall, that this response is primarily an exchange with fallow land and secondarily an exchange with not-cultivated land. There appears to be a similar response for irrigated land but it is unclear whether the exchange is with fallow land, with nonirrigated land, or with both.3/

In general, the irrigated cultivated land averages approximately 530 km^2 and the combination of fallow and nonirrigated cultivated lands averages approximately 4,980 km^2. Agricultural practices vary regionally within the Syrian Arab Republic. Climatic variables, rainfall patterns in particular, and soil conditions often dictate the difference regional practices, especially for nonirrigated (dryland or rainfed) farming. The importance of the relative magnitudes of fallow and nonirrigated lands will become clearer as assessments are made for the regional (Mohafaza) and subregional (Mantika) administrative units, see Tables 1 and 2.

Mohafaza and Mantika Summaries

Damascus City Mohafaza

The Damascus City Mohafaza/Mantika contains approximately 120 km^2. Land use is dominated by two classifications. First, buildings and roads occupy about 66 km^2, having increased 10 percent from 1976 to 1977. Second, about 20 km^2 are in cultivated land, or about 17 percent of the total in 1977. Cultivated land is entirely under irrigation, which conforms well with the high land use intensification plan developed for the area by the Ministry of Agriculture and Agrarian Reform.

Damascus Mohafaza

The 1975-1977 data for the Damascus Mohafaza can be misleading. Prior to 1976 the Damascus City Mohafaza was statistically reported as part of the Damascus Mohafaza. As a result, areas in the 1975 Damascus Mohafaza land use classifications will be larger than those for 1976 and 1977.

2/ The Annual Agricultural Statistical Abstract, 1977, SAR, MAAR

3/ See discussion of the problems with identifying irrigated land in the Water Resources Chapter of the Natural Resources Annex

Table 1. Major land use by Mohafaza and Mantika, SAR, 1976 (in hectares)

	FOREST	STEPPES AND PASTURE	ROCKS AND SAND	WATER	BUILDINGS AND ROADS	TOTAL NON AGRICULTURE	NOT CULTI-VATED	CULTIVATED LAND	TOTAL CULTIVABLE LAND	TOTAL AREA
DAMASCUS CITY	0.	394.	3614.	60.	6078.	9752.	100.	1597.	1698.	11844.
DAMASCUS CITY	0.	394.	3614.	60.	6078.	9752.	100.	1597.	1698.	11844.
DAMASCUS	605.	18141.	19377.	366.	4495.	24238.	2240.	29680.	31920.	74904.
DUMA	94.	1008626.	38881.	2496.	9553.	50930.	0.	29538.	29538.	1089188.
EL TAL	12.	14494.	44963.	0.	7189.	52152.	9067.	15431.	24498.	91156.
QATANA	6767.	39115.	26422.	413.	4039.	30874.	11193.	27223.	38416.	115172.
ZADABANI	2605.	8579.	20665.	176.	1115.	21956.	11079.	20781.	31860.	65000.
NABEK	1840.	107117.	4819.	56.	2122.	6997.	147.	13519.	13666.	129620.
QATIFA	0.	133299.	11820.	0.	2930.	14750.	0.	9821.	9821.	157870.
DORIA	47.	789.	1540.	54.	4878.	6472.	1130.	3815.	4945.	12253.
YABAROD	2185.	35573.	6351.	5.	1550.	7906.	12057.	8929.	20986.	66650.
DAMASCUS	14155.	1365733.	174838.	3566.	37871.	216275.	46913.	158737.	205650.	1801813.
DAR'A	183.	9490.	12520.	1164.	11768.	25452.	1340.	128535.	129875.	165000.
IZRA	670.	25200.	33260.	9.	7251.	40520.	1380.	140230.	141610.	208000.
DAR'A	853.	34690.	45780.	1173.	19019.	65972.	2720.	268765.	271485.	373000.
SWEIDA	5580.	800.	61925.	0.	5200.	67125.	4138.	69357.	73495.	147000.
SHAHBA	8000.	28500.	96440.	10.	8050.	104500.	4180.	55820.	60000.	201000.
SALKHAD	300.	12240.	123800.	0.	2328.	126128.	500.	67832.	68332.	207000.
SWEIDA	13880.	41540.	282165.	10.	15578.	297753.	8818.	193009.	201827.	555000.
QUNITRA	1354.	16315.	12364.	123.	977.	13464.	141963.	13000.	154963.	186096.
ZOIA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
QUNITRA	1354.	16315.	12364.	123.	977.	13464.	141963.	13000.	154963.	186096.
HOMS	115.	436923.	212857.	1187.	14053.	228097.	0.	207236.	207236.	872370.
TALKALAKH	1320.	8812.	1535.	75.	3105.	4715.	0.	38340.	38340.	53187.
MOKHRAM	0.	196355.	10720.	1896.	3111.	15727.	0.	84461.	84461.	296542.
RASTAN	31.	1839.	655.	276.	1769.	2700.	0.	28771.	28771.	33340.
TADMAR	100120.	2106384.	699500.	34.	2000.	701534.	0.	2430.	2430.	2910468.
QASIR	2013.	558.	6492.	1823.	3332.	11647.	0.	42214.	42214.	56431.
HOMS	103599.	2750871.	931759.	5291.	27370.	964420.	0.	403452.	403452.	4222338.
HAMA	1219.	15803.	38442.	1533.	15443.	55418.	0.	179784.	179784.	252224.
SALAMIYA	64741.	93238.	45908.	90.	5331.	51329.	0.	193242.	193242.	402550.
MASIAF	23918.	3268.	8392.	96.	2122.	10610.	1076.	28784.	29860.	67657.
MAHRDA	0.	24.	1011.	478.	2244.	4633.	0.	23133.	23133.	27790.
HAMA	89878.	112333.	94653.	2197.	25140.	121990.	1076.	424943.	426019.	750221.
GHAB	39041.	2428.	3735.	1880.	6368.	11983.	300.	84340.	84640.	138092.
GHAB	39041.	2428.	3735.	1880.	6368.	11983.	300.	84340.	84640.	138092.

(Continued)

Table 1. Continued

	FOREST	STEPPES AND PASTURE	ROCKS AND SAND	WATER	BUILDINGS AND ROADS	TOTAL NON AGRICULTURE	NOT CULTI-VATED	CULTIVATED LAND	TOTAL CULTIVABLE LAND	TOTAL AREA
TARTOUS	4392.	439.	1081.	372.	3364.	4817.	0.	47613.	47613.	57261.
BANIAS	14350.	21.	11375.	250.	3340.	14965.	0.	29190.	29190.	58526.
SAFITA	2247.	0.	1635.	150.	700.	2485.	0.	30003.	30003.	34735.
DARIKISH	2630.	456.	3228.	10.	544.	3782.	0.	11951.	11951.	18819.
SHEKH BADR	7132.	0.	870.	160.	477.	1507.	0.	11244.	11244.	19883.
TARTOUS	30751.	916.	18189.	942.	8425.	27556.	0.	130001.	130001.	189224.
LATTAKIA	45509.	905.	2389.	1173.	4990.	8552.	3971.	41063.	45033.	100000.
HAFA	14824.	1579.	2975.	227.	1225.	4427.	1585.	17178.	18763.	39593.
JABLEH	14942.	458.	16033.	226.	1090.	17349.	3187.	26909.	30096.	62845.
QARDAHA	7369.	195.	5754.	22.	399.	6175.	3286.	10226.	13512.	27251.
LATTAKIA	82644.	3137.	27151.	1648.	7704.	36503.	12029.	95376.	107404.	229689.
IDLEB	10.	3478.	4961.	168.	6086.	11215.	0.	103021.	103021.	117724.
HAREM	456.	6211.	27563.	0.	1352.	28915.	0.	46418.	46418.	82000.
JISR	46000.	3000.	22000.	1000.	3525.	26525.	0.	35000.	35000.	110525.
MA'RA	0.	58082.	33720.	0.	7324.	41044.	0.	132881.	132881.	232007.
ARIHA	0.	6000.	32452.	0.	5000.	37452.	0.	24000.	24000.	67452.
IDLEB	46466.	76771.	120696.	1168.	23287.	145151.	0.	341320.	341320.	609708.
A'ZAZ	0.	1775.	35660.	1660.	5060.	42380.	0.	109845.	109845.	154000.
A'FARIN	24987.	4500.	44000.	0.	3350.	47350.	0.	128163.	128163.	205000.
BAB	2.	848.	8329.	149.	2721.	11199.	0.	183238.	183238.	195287.
MANBAJ	4.	2838.	19744.	21665.	4801.	46210.	0.	227357.	227357.	276409.
JARABLOS	0.	0.	8049.	0.	987.	9036.	0.	55217.	55217.	64253.
A'IN EL A'RB	0.	5600.	67200.	2920.	4500.	74620.	0.	192780.	192780.	273000.
JABL SAM'AN	736.	6267.	55094.	0.	10876.	65970.	0.	204751.	204751.	277724.
SAFIRA	0.	223098.	46514.	0.	3049.	49563.	0.	131666.	131666.	404327.
ALLEPPO	25729.	244926.	284590.	26394.	35344.	346328.	0.	1233017.	1233017.	1850000.
HASAKEH	6000.	700000.	24500.	3000.	7500.	35000.	90362.	384000.	474362.	1215362.
QAMISHLI	0.	923.	505.	0.	3000.	3505.	7760.	390000.	397760.	402188.
MALKAI	400.	48000.	14970.	0.	1400.	16370.	1274.	269557.	270831.	335601.
RAS EL A'IN	29.	60000.	615.	1200.	1480.	3295.	16884.	300000.	316884.	380208.
HASAKEH	6429.	808923.	40590.	4200.	13380.	58170.	116280.	1343557.	1459837.	2333359.
RAQA	50.	979367.	30643.	50472.	16663.	97778.	2536.	370054.	372590.	1449785.
TEL ABIAD	15.	152645.	1880.	755.	7404.	10039.	0.	349102.	349102.	511801.
RAQA	65.	1132012.	32523.	51227.	24067.	107817.	2536.	719156.	721692.	1961586.
DIER EL ZOR	1027.	885265.	367450.	10.	15600.	383060.	2000.	88648.	90648.	1360000.
MAIADIN	97.	836000.	732150.	0.	1800.	733950.	3000.	21953.	24953.	1595000.
BOKAMAL	491.	236832.	88500.	20.	1326.	89846.	0.	23831.	23831.	351000.
DIER EL ZOR	1615.	1958097.	1188100.	30.	18726.	1206856.	5000.	134432.	139432.	3306000.
SYRIAN ARAB REPUBLIC	456459.	3549086.	3260747.	99909.	269334.	3629990.	337735.	5544702.	5882437.	18517970.

Table 2. Major land use by Mohafaza and Mantika, SAR, 1977 (in hectares)

	FOREST	STEPPES AND PASTURE	ROCKS AND SAND	WATER	BUILDINGS AND ROADS	TOTAL NON AGRICULTURE	NOT CULTI-VATED	CULTIVATED LAND	TOTAL CULTIVABLE LAND	TOTAL AREA
DAMASCUS CITY	310.	0.	2780.	50.	6607.	9437.	75.	2022.	2097.	11844.
DAMASCUS CITY	310.	0.	2780.	50.	6607.	9437.	75.	2022.	2097.	11844.
DAMASCUS	618.	18056.	19353.	366.	4525.	24244.	2240.	29746.	31986.	74904.
DUMA	137.	1011199.	38653.	2496.	10526.	51675.	0.	26177.	26177.	1089188.
EL TAL	15.	14493.	44907.	0.	7201.	52108.	8968.	15572.	24540.	91156.
QATANA	6767.	39574.	26422.	413.	4039.	30874.	8485.	29472.	37957.	115172.
ZADABANI	2623.	8569.	20665.	176.	1379.	22220.	9644.	21944.	31588.	65000.
NABEK	1840.	106965.	4819.	56.	2122.	6997.	147.	13671.	13818.	129620.
QATIFA	0.	133348.	11820.	0.	2930.	14750.	0.	9772.	9772.	157870.
DORIA	47.	789.	1540.	54.	4878.	6472.	1130.	3815.	4945.	12253.
YABAROD	2185.	33653.	6271.	5.	1634.	7910.	8627.	14275.	22902.	66650.
DAMASCUS	14232.	1366646.	174450.	3566.	39234.	217250.	39241.	164444.	203685.	1801813.
DAR'A	223.	9490.	12520.	1164.	11778.	25462.	1335.	128490.	129825.	165000.
IZRA	730.	25180.	33260.	9.	7255.	40524.	1350.	140216.	141566.	208000.
DAR'A	953.	34670.	45780.	1173.	19033.	65986.	2685.	268706.	271391.	373000.
SWEIDA	3988.	58394.	26720.	22.	5200.	31942.	4860.	69357.	74217.	168541.
SHAHBA	2074.	140147.	64123.	15.	2461.	66599.	8600.	47024.	55624.	264444.
SALKHAD	30.	35036.	16030.	100.	1781.	17911.	9380.	59658.	69038.	122015.
SWEIDA	6092.	233577.	106873.	137.	9442.	116452.	22840.	176039.	198879.	555000.
QUNITRA	1354.	16315.	12364.	123.	977.	13464.	141963.	13000.	154963.	186096.
ZOTA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
QUNITRA	1354.	16315.	12364.	123.	977.	13464.	141963.	13000.	154963.	186096.
HOMS	88.	434610.	212706.	999.	14719.	228424.	0.	209248.	209248.	872370.
TALKALAKH	1520.	8702.	1400.	75.	3150.	4625.	0.	38340.	38340.	53187.
MOKHRAM	0.	197960.	10577.	1896.	3123.	15596.	0.	82986.	82986.	296542.
RASTAN	31.	1839.	655.	276.	1769.	2700.	0.	28771.	28771.	33341.
TADMAR	100120.	2107119.	699500.	34.	2000.	701534.	0.	1695.	1695.	2910468.
QASIR	2003.	359.	6492.	1823.	3332.	11647.	0.	42424.	42424.	56431.
HOMS	103762.	2750589.	931330.	5103.	28093.	964526.	0.	403464.	403464.	4222339.
HAMA	1219.	15990.	38252.	1551.	15457.	55260.	0.	179754.	179754.	252223.
SALAMIYA	64741.	93238.	45908.	90.	5331.	51329.	0.	193242.	193242.	402550.
MASIAF	23783.	5403.	8064.	96.	3612.	11772.	6963.	19736.	26699.	67657.
MAHRDA	0.	24.	1911.	478.	2244.	4633.	0.	23133.	23133.	27790.
HAMA	89743.	114655.	94135.	2215.	26644.	122994.	6963.	415865.	422828.	750220.
GHAB	39041.	2964.	3199.	1880.	6368.	11447.	300.	84340.	84640.	138092.
GHAB	39041.	2964.	3199.	1880.	6368.	11447.	300.	84340.	84640.	138092.

(Continued)

Table 2. Continued

	FOREST	STEPPES AND PASTURE	ROCKS AND SAND	WATER	BUILDINGS AND ROADS	TOTAL NON AGRICULTURE	NOT CULTI-VATED	CULTIVATED LAND	TOTAL CULTIVABLE LAND	TOTAL AREA
TARTOUS	4375.	376.	781.	382.	3614.	4777.	322.	47411.	47733.	57261.
BANIAS	14350.	21.	11375.	250.	3400.	15025.	0.	29130.	29130.	58526.
SAFITA	2244.	0.	1630.	150.	710.	2490.	0.	30003.	30003.	34735.
DARIKISH	2630.	456.	3228.	10.	544.	3782.	0.	11951.	11951.	18819.
SHEKH BADR	7132.	0.	870.	160.	480.	1510.	0.	11241.	11241.	19883.
TARTOUS	30731.	853.	17884.	952.	8748.	27584.	322.	129736.	130058.	189224.
LATTAKIA	46702.	976.	2354.	1246.	5173.	8773.	1859.	41117.	42976.	99427.
HAFA	14712.	1501.	2970.	227.	1230.	4427.	2675.	15788.	18463.	39103.
JABLEH	15084.	435.	15889.	226.	1114.	17229.	3161.	26936.	30097.	62845.
QARDAHA	7488.	306.	5849.	37.	445.	6331.	3417.	10772.	14189.	28314.
LATTAKIA	83986.	3218.	27062.	1736.	7962.	36760.	11112.	94613.	105725.	229689.
IDLEB	10.	2778.	8787.	168.	6786.	15741.	0.	99195.	99195.	117724.
HAREM	456.	6211.	26646.	0.	1352.	27998.	0.	47335.	47335.	82000.
JISR	47000.	3000.	13855.	1000.	3525.	18380.	0.	36145.	36145.	104525.
MA'RA	0.	60778.	32157.	0.	8395.	40552.	0.	132881.	132881.	234211.
ARIHA	0.	4882.	38106.	0.	5000.	43106.	0.	25464.	25464.	73452.
IDLEB	47466.	77649.	119551.	1168.	25058.	145777.	0.	341020.	341020.	611912.
A'ZAZ	0.	1943.	40005.	1700.	6547.	48252.	0.	105430.	105430.	155625.
A'FARIN	25057.	4450.	43312.	0.	3313.	46625.	0.	127243.	127243.	203375.
BAB	2.	848.	8329.	149.	2721.	11199.	0.	183238.	183238.	195287.
MANBAJ	4.	1878.	15892.	18452.	4204.	38548.	0.	235979.	235979.	276409.
JARABLOS	0.	0.	8049.	0.	987.	9036.	0.	55217.	55217.	64253.
A'IN EL A'RB	0.	4300.	67000.	2920.	4500.	74420.	0.	194280.	194280.	273000.
JABL SAM'AN	736.	6686.	58047.	0.	10744.	68791.	0.	201511.	201511.	277724.
SAFIRA	0.	5172.	264440.	0.	3049.	267489.	0.	131666.	131666.	404327.
ALLEPPO	25799.	25277.	505074.	23221.	36065.	564360.	0.	1234564.	1234564.	1850000.
HASAKEH	6000.	700000.	18987.	3000.	13013.	35000.	28979.	445383.	474362.	1215362.
QAMISHLI	0.	923.	505.	0.	3000.	3505.	24000.	373760.	397760.	402188.
MALKAI	400.	48000.	14970.	0.	1400.	16370.	62301.	208530.	270831.	335601.
RAS EL A'IN	29.	60000.	615.	1200.	1480.	3295.	1000.	315884.	316884.	380208.
HASAKEH	6429.	808923.	35077.	4200.	18893.	58170.	116280.	1343557.	1459837.	2333359.
RAQA	2.	907088.	30643.	50470.	18663.	99776.	1923.	440996.	442919.	1449785.
TEL ABIAD	8.	234358.	1680.	750.	7400.	9830.	98.	267507.	267605.	511801.
RAQA	10.	1141446.	32323.	51220.	26063.	109606.	2021.	708503.	710524.	1961586.
DIER EL ZOR	1027.	885365.	363147.	4313.	15600.	383060.	4070.	86478.	90548.	1360000.
MAIADIN	97.	837950.	730195.	1955.	1800.	733950.	2550.	20453.	23003.	1595000.
BOKAMAL	491.	234782.	85958.	2562.	1326.	89846.	4136.	21745.	25881.	351000.
DIER EL ZOR	1615.	1958097.	1179300.	8830.	18726.	1206856.	10756.	128676.	139432.	3306000.
SYRIAN ARAB REPUBLIC	451523.	8534879.	3287182.	105574.	277913.	3670669.	354558.	5508549.	5863107.	18520174.

The Damascus Mohafaza occupies 18,020 km^2, or about 10 percent of the total surface area of the Syrian Arab Republic. The Mohafaza extends from Lebanon in the west, with mountains and high rainfall zones, to Jordan in the east, with desert and steppe land and very low rainfall zones. The higher rainfall zones form a narrow north-south band in the west and generally represent more intensive agricultural areas. The steppes/pasture classification accounts for 13,670 km^2, or 76 percent of the surface area. By 1977, total cultivable land had decreased to 2,040 km^2 or 11 percent of the surface area. In addition, nonagricultural, primarily rocky/sandy land, constitutes about 2,170 km^2 or 12 percent of surface area.

Although total cultivable land decreased from 1975 to 1977, cultivated land increased 50 km^2 to 1,640 km^2 in 1977 compared with an average 1,590 km^2 for 1975-1976. Land not cultivated decreased 78 km^2 from 1975 to 1977 and more than offset the latter increase. This may be a strong indication of rapid and successful land improvement projects and programs in the agriculturally suitable western portion of the Damascus Mohafaza. The irrigated portion of cultivated land remained relatively stable at about 690 km^2. The proportionate mix of nonirrigated cultivated land and fallow indicates a predominance in the region of either crop-fallow or crop-fallow-fallow rotations, a likely result of the vast expanse of the Mohafaza which receives low rainfall. Although trends based on three years of information are not definitive, it appears that the crop-fallow rotation may be becoming more utilized.

Damascus Mantika. Approximately 320 km^2, or 43 percent of Damascus Mantika's 750 km^2 total area were cultivable. About 300 km^2 were cultivated, and about 75 percent or 170 km^2 of the cultivated land was irrigated. Nonirrigated (60 km^2) and fallow land (170 km^2) indicate a crop fallow rotation for rainfed agriculture through stabilization zones 3 and 4. Steppes/pasture and rocky/sandy land account for 180 and 190 km^2, respectively, of the remaining total area.

Duma Mantika. Duma Mantika, in the eastern porition of Damascus Mohafaza, is entirely within stabilization zone 5, desert/steppe. It is a very large subregion, 10,890 km^2 in total area. Nearly 93 percent of Duma is classified as steppes/pasture with rocky/sandy land constituting an additional 4 percent.

An average 280 km^2 is cultivable, cultivated and almost entirely irrigated. Water area contributes 25 km^2 to the total area, and corresponds well to the extent of irrigated land in an arid subregion.

Tall Mantika. Land use on the 910 km^2 of Tall Mantika, located just north of Damascus Mantika, is considerably different. The subregion maintained 245 km^2 of cultivable land, of which 155 km^2 were cultivated, and about 90 km^2 were not. An average of 15 km^2 of the cultivated land was irrigated, 80 km^2 nonirrigated, and 60 km^2 fallowed. The nonirrigated: fallow ratio of about 1:1 indicates a crop-fallow rotation.

Rocky/sandy land was the largest land use component with 430 km^2. Steppes/pasture added an additional 145 km^2, with water area reported at zero.

In comparison with Damascus Mantika, Tall has: (1) a larger total area, (2) less cultivable land, (3) considerably less cultivated land, and (4) less than one tenth the irrigated cultivated land with no water area reported.

Qatana Mantika. Mantika lies just to the southwest of Damascus Mantika in stabilization zones 1, 2, and 3. Of a 1,150 km^2 total area, about 380 km^2 were classified as cultivable with an average 280 km^2 cultivated. The average division of cultivated land was 80 km^2 irrigated, 105 km^2 nonirrigated and 90 km^2 fallow. The nonirrigated: fallow ratio suggests a crop-fallow rotation.

The largest single major land classification was steppes/pasture with about 390 km^2 or 34 percent of Qatana's total area. An additional 260 km^2 or 23 percent was rocky/sandy land, and forest land accounted for 70 km^2 or 6 percent.

Al-Zabadani Mantika. Al-Zabadani Mantika, northwest of Damascus Mantika, lies almost entirely in stabilization zone 1, the highest rainfall zone. Al-Zabadani's 650 km^2 total area had 320 km^2 of cultivable land, with an average 210 km^2 cultivated. The cultivated land averaged 60 km^2 irrigated, 130 km^2 nonirrigated, and 20 km^2 fallow. Data indicate some conversion of noncultivated land to cultivated land through improvement from 1976 to 1977, but two years' data are inconclusive. The nonirrigated: fallow ratio indicates general annual cropping, as expected in a high rainfall subregion where moisture is not likely to be a constraint to continuous agricultural production.

Rocky/sandy land composed 32 percent or 210 km^2 of Al-Zabadani's area, with 85 km^2 of steppes/pasture and 26 km^2 of forested land making up the rest of the total.

<u>Al-Nabek Mantika</u>. Al-Nabek is located in the extreme northern portion of Damascus Mohafaza, bordering Lebanon on the west and Homs Mohafaza on the east. An average of 1,070 km^2 or 82 percent of the 1,300 km^2 total area was classified as steppes/pasture. Cultivable land averaged just 140 km^2, nearly all of which was cultivated. Irrigated cultivated land was stable at about 17 km^2. Nonirrigated and fallow lands combined to average 120 km^2. The fluctuating nonirrigated: fallow ratio in stabilization zones 3, 4, and 5 indicates crop-crop-fallow and crop-fallow rotations for rainfed agriculture in this subregion. Al-Nabek also maintained approximately 20 km^2 in forest land and 50 km^2 in rocky/sandy land.

<u>Al-Quteifeh Mantika</u>. Al-Quteifah is situated between Tall and Duma to the south and Al-Nabek to the north. It lies almost completely in stabilization zone 5, steppes/desert. The major land use classification, steppes/pasture, occupied 1,330 km^2 or 84 percent of Al-Quteifeh's 1,580 km^2 total area. Rocky/sandy land accounted for 120 km^2 or about 8 percent of the total.

Cultivable land was restricted to approximately 100 km^2, all cultivated. Cultivated land was split with 30 km^2 irrigated and 67 km^2 combined in nonirrigated and fallow lands. The nonirrigated: fallow ratio for Al-Quteifeh fluctuates but suggests a crop-fallow-fallow rotation for rainfed agriculture similar to that of Al-Nabek.

<u>Daraya Mantika</u>. Daraya Mantika was formed in 1976, basically being the former southwestern section of Damascus Mantika. Although very small in total area, 122 km^2, Daraya had 49 km^2 or about 40 percent cultivable land, 38 km^2 of which were cultivated. Irrigated land constituted 34 km^2 of the cultivated land with nonirrigated and fallow lands relatively insignificant. The buildings and roads classification was nearly equal to cultivated land.

<u>Yabarod Mantika</u>. Yabarod Mantika was separated from the western portion of Al-Nabek Mantika in 1976. Most of its approximate 670 km^2 total area was in steppes/pasture (350 km^2) and cultivable land (220 km^2). The cultivable land total appears stable but the cultivated land and not-cultivated classifications are not. A procedural difficulty is indicated in the application of definitions for not-cultivated land and fallow land. Also, its location in stabilization zones 2 and 3 may result in nonirrigated cultivated land rotating in and out of production in response to fluctuating climatic conditions. Irrigated cultivated land averaged about 12 km^2.

<u>Dar'a Mohafaza</u>

The Dar'a Mohafaza is largely an agricultural region. Nearly 73 percent of the region's 3,730 km^2 of surface area was classified as cultivable in 1977. Rocky/sandy land and steppes/pasture land together account for an additional 22 percent.

Of the 2,710 km^2 of cultivable land, 2,690 km^2 are cultivated. Only about 5 percent of the cultivated land was irrigated in 1976-1977. Non-irrigated and fallow lands appear to be used in crop-fallow and crop-fallow-fallow rotations. This again characterizes the rotations specified by agricultural planners for stabilization zones 2 and 3, which dominate the Dar'a Mohafaza.

Dar'a Mantika. Dar'a Mantika, in the southern portion of Dar'a Mohafaza, borders Lebanon and is traversed by stabilization zones 1, 2, and 3. The 1,650 km^2 total area is predominantly cultivable (1,300 km^2), of which 99 percent is cultivated. An average of about 120 km^2 was irrigated, and the combined average of nonirrigated and fallow was 1,170 km^2. The nonirrigated: fallow ratio for Dar'a suggests a mixture of rotations for rainfed agriculture.

The 12 km^2 of water area support the relatively high irrigated hectarage. Steppes/pastures and rocky/sandy land totaled 220 km^2.

Izra' Mantika. Isra' Mantika is crossed by stabilization zones 1-4, but the majority of land is covered by zones 2 and 3. The total area of (2,080 km^2) is classified as 1,420 km^2 cultivable, 330 km^2 rocky/sandy, and 250 km^2 steppes/ pasture.

Cultivable land is divided with an average 12 km^2 irrigated, 900 km^2 nonirrigated and 490 km^2 fallow. The implied rotation for rainfed agriculture is crop-crop-fallow.

Al-Sweida Mohafaza

Al-Sweida Mohafaza's major land use will be examined using 1975 and 1977 information only. Although internally consistent, the 1976 information diverges too abruptly from the other two years to be considered with them. The divergence probably stems from procedural changes, in particular the application of definitions for steppes/pasture, rocky/sandy, and non-cultivated lands.

The two major land classifications in the 5,550 km^2 of Al-Sweida Mohafaza are steppes/pasture with 2,340 km^2 and cultivable land with approximately 1,990 km^2. Rocky/sandy land is third at 1,060 km^2. The major classifications show absolutely no change from 1975 to 1977, which is difficult to believe given the dynamic change generally present in the Syrian Arab Republic. This may reflect a procedural problem in the collection and reporting of land use information in this Mohafaza.

Cultivated land use in Al-Sweida Mohafaza totals 1,760 km^2 and no irrigated cultivated land is reported. Nonirrigated and fallow lands indicate a dominant crop-fallow rotation through this region which is largely covered

by stabilization zones 2 and 3. Stabilization zones 4 and 5 also traverse this Mohafaza in narrow north-south bands. Longer fallow periods in the lower rainfall zones lead to a higher proportion of land in fallow than in nonirrigated cultivated land.

Due to the data reporting discrepancies noted above, the Al-Sweida Manatik (Al-Sweida, Shahba, Salkhad) are examined only in light of their 1977 statistical information.

Al-Sweida Mantika. Al-Sweida Mantika occupies the middle range of Al-Sweida Mohafaza, bordering Dar'a Mohafaza on the west and Duma Mantika of Damascus Mohafaza on the east. All five stabilization zones cover this subregion, with only a small spot of zone 1 evident. Of 1,690 km^2 total area, cultivable land with 740 km^2 is the largest classification, and 690 km^2 of this is cultivated. No irrigated cultivated land is reported and the nonirrigated: fallow ratio is less than 2:1, suggesting some annual cropping mixed with a crop-fallow rotation characterizing general rainfed agriculture. Steppes/ pasture and rocky/sandy land occupy 580 and 270 km^2, respectively. An additional 40 km^2 are forested.

Shahba Mantika. As the largest Mantika in Al-Sweida Mohafaza with 2,640 km^2, Shahba had only 560 km^2 of cultivable land, or 21 percent of the total area. However, nearly 84 percent (470 km^2) was cultivated, with none irrigated. The nonirrigated:fallow ratio, as in Al-Sweida Mantika, indicates a reliance on annual cropping and a crop-fallow rotation for rainfed operations. More than 53 percent (1,400 km^2) of the total area was classified as steppes/ pasture, and 24 percent (640 km^2) was rocky/ sandy land.

Salkhad Mantika. Most of Salkhad Mantika is covered by stabilization zones 3, 4 and 5. It is situated in the extreme south of the Syrian Arab Republic, bordering Jordan. Approximately 57 percent (690 km^2) of its 1,220 km^2 total area was cultivable. Cultivated land totaled 87 percent (600 km^2) of cultivable land and none of it was irrigated. There was some difficulty in interpreting the nonirrigated:fallow ratio. The ratio appeared to be about 1:4, which would place any rotation byond the definition of fallow land in the major land use classification scheme. Data are insufficient to properly assess this problem.

Steppes/pasture and rocky/sandy land classification showed 350 and 160 km^2, respectively.

Quneitra Mohafaza

The Quneitra Mohafaza is located in the extreme southwest corner of the Syrian Arab Republic, bordering Lebanon and Jordan. Land use distribution data were not available for the years 1968-1973, and the data available since then have been frozen at the level listed in the data tables.

Basically, Quneitra Mohafaza is agricultural with more than 83 percent of its 1,860 km^2 classified as cultivable. Stabilization zone 1 covers the entire region, which should lead to extensive nonirrigated cultivated land, given suitable soil characteristics. However, 1,410 km^2 of the 1,500 km^2 cultivable land are classified as not cultivated. Not-cultivated land, according to the land use definitions, requires some form of land improvement before cultivation can occur. Further discussion of this large expanse of not-cultivated land in a high rainfall zone is found in the description of Resource Planning Units. The remaining cultivated land, 1,200 km^2 nonirrigated and 10 km^2 irrigated, leaves the Quneitra Mohafaza with a very limited agricultural land base, which contradicts the first investigation of cultivable land and general rainfall levels.

Quneitra Mohafaza has to Manatik, Quneitra and Al-Zaweieh but no statistics are available to consider them separately.

Homs Mohafaza

The Homs Mohafaza is the largest administrative region in the Syrian Arab Republic, covering 42,220 km^2. It basically traverses the midsection of the Republic, extending from a western border with Lebanon to an eastern border with Iraq. All five stabilization zones cross the Homs Mohafaza, but the higher rainfall zones cross a very limited area of the western portion of the region.

The steppes/pasture occupy 27,510 km^2 and rocky/sandy land occupies 9,310 km^2; or together, over 87 percent of the Homs Mohafaza total area. This alone shows the extent to which land is dry and uncultivated. The region has the largest forested area in the Republic with over 1,030 km^2.

Cultivable land over 4,030 km^2, is entirely cultivated but less than 10 percent of it is irrigated. However, the nearly 400 km^2 irrigated land represents almost 8 percent of Syria's irrigated cultivated land. Nonirrigated cultivated and fallow land totaled more than 3,600 km^2 in 1976-1977 with an average of more than 2,000 km^2 nonirrigated cultivated. Again, the nonirrigated/fallow land mix suggests crop-crop-fallow and crop-fallow rotations.

Homs Mantika. Homs Mantika is a jagged, horseshoe-shaped area of 8,720 km^2 crossed by all five stabilization zones. Steppes/pasture is the largest land classification with an average 4,360 km^2, rocky/sandy land is second with 2,130 km^2 and cultivable land is third with 2,080 km^2.

All cultivable land is cultivated with an average 117 km^2 irrigated, 1,170 km^2 nonirrigated, and 800 km^2 fallow. The nonirrigated:fallow ratio would suggest an annual cropping and crop-fallow rotation for rainfed agriculture.

Talkalakh Mantika. In the extreme west of Homs Mohafaza, Talkalakh's 530 km^2 lie entirely in stabilization zone 1. Nearly 73 percent (more than 380 km^2) is cultivable, and all of that is cultivated. Talkalakh maintains an average of 58 km^2 irrigated land and 325 km^2 nonirrigated. The nonirrigated land is in annual agricultural production with no fallowing activity.

Al-Mokhram Mantika. Al-Mokhram Mantika's 2,970 km^2 lie in the north central portion of Homs Mohafaza, crossed by stabilization zones 3, 4, and 5. Steppes/pasture average 1,970 km^2 with cultivable land accounting for 840 km^2. All cultivable land was cultivated and almost all cultivated land was either nonirrigated or fallow. The nonirrigated:fallow ratio of approximately 1:1 indicates a dominant crop-fallow rotation for rainfed agriculture.

Al-Rastan Mantika. Al-Rastan is a very small Mantika with just a 330 km^2 area. However, nearly 88 percent of the total area was cultivable land, all cultivated. Approximately 110 of the 290 km^2 cultivated land were irrigated, with the remainder split between nonirrigated and fallow at a ratio of approximately 1:1. A crop-fallow rotation would typify rainfed agriculture for this subregion.

Tadmar Mantika. Tadmar is the largest Mantika in Syria with 29,100 km^2. In terms of agricultural production, Tadmar was relatively insignificant with a scant average of 20 km^2 classified as cultivable, mostly irrigated. The real agricultural potential would seem to be in forest products (1,000 km^2 of forest land), and in forage and grazing (21,070 km^2 of steppes/pasture land). An additional 7,000 km^2 were classified as rocky/sandy land. All of this Mantika lies in stabilization zone 5.

Al-Koseir Mantika. Al-Koseir borders Lebanon and lies within the horseshoe of Homs Mantika, crossed by stabilization zones 2, 3, and 4. The total area of 560 km^2 was 75 percent (420 km^2) cultivable, all cultivated. Cultivated land averaged 84 km^2 irrigated, 100 km^2 nonirrigated, and 150 km^2 fallow. The nonirrigated:fallow ratio indicates the use of crop-fallow and crop-fallow-fallow rotations for rainfed agriculture.

Hama Mohafaza

The Hama Mohafaza is highly oriented toward agriculture. All five stabilization zones traverse the region, but zones 1 and 2 appear to cover about half of it. Cultivable land amounts to about 4,230 km^2 of the region's 7,500 km^2 total area. The region maintains the second largest forested area with about 900 km^2. Steppes/pasture and rocky/sandy land account for about 1,130 km^2 and 94 km^2, respectively.

Although the region has over 310 km^2 of irrigated cultivated land, the nonirrigated cultivated and fallow land classifications dominate cultivable land, ranging from about 3,700 to 3,840 km^2 during the 1975-1977 period.

A simple nonirrigated:fallow ratio is about 2:1, indicating that a crop-crop-fallow rotation may typify rainfed agriculture in the region.

Hama Mantika. The Hama Mantika occupies two noncontiguous areas within the Hama Mohafaza, totaling 2,520 km^2 primarily in stabilization zones 2 and 3. Nearly 1,800 km^2 were cultivable, all reported to be cultivated. Approximately 150 km^2 were irrigated, 1,150 km^2 nonirrigated, and 500 km^2 fallow. The nonirrigated:fallow ratio of about 2:1 would indicate crop-fallow and crop-crop-fallow rotations. Steppes/pasture land and rocky/sandy land occupied 160 km^2, respectively.

Al-Salamiya Mantika. Al-Salamiya, in the eastern section of Hama Mohafaza, is traversed by stabilization zones 2-4 and has a total area of 4,030 km^2. More than 1,930 km^2 were classified as cultivable, and all cultivable land was cultivated. The cultivated land averaged about 95 km^2 irrigated, 1,140 km^2 nonirrigated and 700 km^2 fallow. A general crop-crop-fallow rotation is implied for rainfed agriculture, based on the nonirrigated:fallow ratio.

Al-Salamiya maintained the second largest forested land area in the Syrian Arab Republic with nearly 750 km^2. Steppes/pasture (930 km^2) and rocky/sandy land (460 km^2) occupied the rest of the subregion's total area.

Misiaf Mantika. Misiaf has two sources of agricultural importance--240 km^2 of forest land and 280 km^2 cultivable land--on its 680 km^2 total area.

The variation among the classifications comprising cultivable land renders an accurate assessment impossible. These include cultivated, not-cultivated, irrigated, nonirrigated and fallow lands. The problem may stem from a situation similar to that discussed under the Al-Ghab Mohafaza's major land use. Briefly, the use of supplemental irrigation and the rotation of land in and out of cultivation in response to climatic conditions may serve to confuse data enumeration.

Mahrda Mantika. Mahrda is crossed by stabilization zone 1 and situated in the northwest area of Hama Mohafaza. Although it is small (280 km^2), over 82 percent of its land area was classified as cultivable, with all cultivable land classified as cultivated. The cultivated land averages about 60 km^2 irrigated and 170 km^2 nonirrigated. All nonirrigated land is apparently cropped annually since no land was reported in fallow.

Al-Ghab Mohafaza

Al-Ghab Mohafaza/Mantika was developed to be an agricultural region. Cultivable land represents 850 km^2 or 61 percent of the region's total area. The region also maintains about 390 km^2 of forested land.

Over the three years under examination, cultivable land has remained almost entirely cultivated, either irrigated or nonirrigated, with fallow playing a negligible role. The fluctuation in the irrigated and non-irrigated levels would seem to suggest the extensive use of in-place, supplemental irrigation systems during certain dry periods. This may result in reclassification of land between irrigated and nonirrigated from year to year, a practice described by Syrian agricultural planners as a common source of confusion in data collection and reporting.

Tartous Mohafaza

The 1,890 km^2 of Tartous Mohafaza lie entirely within stabilization zone 1, the highest rainfall zone. The region, one of two Syrian regions with Mediterranean coastline, is primarily devoted to agriculture with 1,300 km^2 classified cultivable and 310 km^2 classified as forest.

For all practical purposes, the cultivable land is entirely cultivated. The cultivated land is consistently about 87 percent nonirrigated and 13 percent irrigated. The nonirrigated cultivated land is cropped each year, since fallowing is not undertaken in this Mohafaza.

Tartous Mantika. Tartous Mantika, like all Manatik in Tartous Mohafaza, lies in stabilization zone 1 in proximity to the Mediterranean Sea. Nearly 480 km^2 of its 570 km^2 total area were classified as cultivable. Cultivable land was almost entirely cultivated, and averaged 110 km^2 irrigated and 365 km^2 nonirrigated with no fallow. Over 40 km^2 were forested.

Banias Mantika. Cultivable land (290 km^2) formed 49 percent of Banias's 590 km^2 total area. All cultivable land was cultivated and averaged 30 km^2 irrigated and 260 km^2 nonirrigated with no fallow. There were also 140 km^2 of forest and 110 km^2 of rocky/sandy land.

Safita Mantika. Safita is an agricultural subregion with about 300 km^2 of its 350 km^2 total area classified as cultivable. All of this land was cultivated. It included 20 km^2 irrigated and 280 km^2 nonirrigated with no fallow. Slightly over 22 km^2 of the total area were forested.

Draikish Mantika. The majority of the land in Draikish Mantika (63 percent of 190 km^2) is classified as cultivable, which is typical in this Mohafaza. The cultivable area was entirely cultivated, with less than 10 km^2 irrigated, more than 110 km^2 nonirrigated, and no fallow. Forest land and rocky/sandy land occupied 26 km^2 and 32 km^2, respectively.

Al-Shekh Badr Mantika. Al-Shekh Badr, again very typical of Tartous Mohafaza, had 11 km^2 classified cultivable, in 20 km^2 total area. All cultivable land was cultivated and was almost entirely classified as non-irrigated with no fallow. Forest land was the second largest classification with over 70 km^2.

Lattakia Mohafaza

Lattakia Mohafaza, like Tartous, lies entirely within stabilization zone 1 and has the Mediterranean Sea as a western bounday. Cultivable land (1,060 km^2) and forest land (930 km^2), when combined, account for 82 percent of Lattakia's total area of 2,300 km^2. The relative stability of areas in the various major land use classifications from 1975-1977 would indicate that the reduction in rocky/sandy land between 1975-1976 directly corresponds to the increase of 12,000 hectares under the not-cultivated classification in 1976. This would reflect a procedural change in the classification of land or perhaps a reassessment of the potential cultivability of some land previously classified as rocky/sandy.

Approximately 18 percent of the 950 km^2 cultivated land is irrigated. Nonirrigated land, annually cropped with very limited fallowing, averages about 720 km^2.

Lattakia Mantika. Lattakia Mantika is situated in the north of Lattakia Mohafaza and along with all of Lattakia and Tartous Mohafazat is entirely eithin stabilization zone 1 near the Mediterranean Sea. An average of 440 km^2 were cultivable in this 1,000 km^2 Mantika. About 410 km^2 of cultivable land were cultivated, 70 km^2 irrigated and 330 km^2 nonirrigated, with a small residual of fallow land. The largest classified area was forest land with 460 km^2.

Al-Hiffeh Mantika. With a total area of 390 km^2, Al-Hiffeh's two largest area classifications were cultivable land (190 km^2) and forest land (150 km^2). Cultivated land totaled over 160 km^2 with an average of less than 10 km^2 irrigated, over 140 km^2 nonirrigated, and about 10 km^2 fallow.

Jableh Mantika. The largest areas of use classification in the 630 km^2 of Jableh Mantika were 300 km^2 cultivable, 160 km^2 rocky/sandy land, and 150 km^2 forest land. Cultivable land was 90 percent cultivated, with 90 km^2 irrigated, 160 km^2 nonirrigated, and 20 km^2 fallowed.

Jableh Mantika borders Banias Mantika of Tartous Mohafaza. These two Manatik are the only two in the Mediterranean area of Syria to have the rocky/sandy land classification at a significant level.

Al-Qardaha Mantika. Al-Qardaha Mantika's total area of 280 km^2 was classified 140 km^2 cultivable, 70 km^2 forest, and 60 km^2 rocky/sandy land. Cultivated land totaled 110 km^2 of the cultivable total, averaging over 90 km^2 nonirrigated with limited fallowing and 5 km^2 irrigated.

Idleb Mohafaza

Idleb Mohafaza also is an agricultural region traversed by stabilization zones 1-3. Nearly 56 percent, or 3,410 km^2 of the region's 6,100 km^2, was classified as cultivable from 1975-1977. The cultivable land has been entirely cultivated, averaging approximately 130 km^2 irrigated, 2,940 km^2 nonirrigated, and 340 km^2 fallow. The very high nonirrigated:fallow ratio suggests annual, rainfed cropping with limited fallowing occurring perhaps in the lower rainfall areas in the eastern portion of the region. Idleb also maintains about 470 km^2 of forest land.

Nonirrigated land and steppes/pasture total about 2,220 km^2. The largest single component of the combination is the 1,200 km^2 of rocky/sandy land.

Idleb Mantika. Most of Idleb Mantika's 1,180 km^2 lie in stabilization zone 1. This subregion is primarily devoted to agricultural production with an average of 1,010 km^2 (86 percent of the total area) cultivable. All cultivable land was cultivated with an average 74 km^2 irrigated, 860 km^2 nonirrigated, and 80 km^2 fallow. The nonirrigated:fallow ratio indicates limited fallowing as a rainfed agricultural practice, probably in the small expanse of Idleb Mantika traversed by stabilization zones 2 and 3.

Harem Mantika. Cultivable land (470 km^2) and rocky/sandy land (270 km^2) dominate Harem's 820 km^2 total area. The cultivable land is all cultivated with only about 20 km^2 irrigated and 450 km^2 nonirrigated. Continuous annual rainfed agricultural production on all nonirrigated land is implied by the absence of fallow land.

Jisr-Al-Shughour Mantika. In Jisr-Al-Shughour Mantika the largest land area classification was forest, averaging 465 km^2 or about 43 percent of the subregion's 1,060 km^2. Cultivable land occupied about 355 km^2, all cultivated, with 20 km^2 irrigated and 330 km^2 nonirrigated with no fallow. Rocky/sandy land was the third largest area of classified land. Its 80 km^2 decrease from 1976 to 1977, like the decrease in total reported area, may have been the result of a possible repartitioning of Manatik.

Ma'arrat'Al-Nu'man Mantika. Nearly 1,330 km^2 of this Mantika's 2,330 km^2 total area was cultivable land. Rainfed agriculture used an average 1,020 km^2 in nonirrigated cultivated land with 300 km^2 in fallow. The nonirrigated:fallow ratio of about 4:1 suggests annual production along with a crop-fallow rotation as a general rainfed farming system.

Two other major land classifications were steppes/pasture with about 590 km^2 and rocky/sandy land with about 330 km^2. No water was reported for this Mantika.

Ariha Mantika. Ariha and Jisr-Al-Shughour seem to have been involved in the procedural change described before. The decreases in rocky/sandy land and total area in Jisr-Al-Shughour appear as increases for Ariha.

Ariha's average 700 km^2 total area is largely divided between rocky/sandy land (average 350 km^2) and cultivable land (average 250 km^2). The cultivable land was entirely cultivated and the cultivated land was nearly all nonirrigated agricultural production with no fallowing activity necessary in stabilization zone 1.

Aleppo Mohafaza

The Aleppo Mohafaza occupies 18,500 km^2 in the northwest of the Syrian Arab Republic. All five stabilization zones cross the region, but zones 1, 2, and 3 cover the majority. Sixty-seven percent of the total area or 12,333 km^2 is cultivable, all of it cultivated. Approximately 690 km^2 of the cultivated land are irrigated, 7,490 km^2 are nonirrigated, and 4,150 km^2 are fallow. With 690 km^2 of irrigated land, Aleppo is one of the larger irrigated agricultural regions. It also has the second highest major area classified as water (average 250 km^2) in the country; the Euphrates River with associated irrigation projects flows along the eastern boundary. The nonirrigated:fallow ratio of approximately 2:1 suggests the predominant use of a crop-crop-fallow rotation.

Aleppo Mohafaza, next to Damascus, is the second most built-up region, with over 360 km^2 of buildings and roads in 1977.

Land classified in a combination of steppes/pasture and rocky/sandy land has remained stable at about 5,300 km^2. However, in 1977 it appeared that approximately 2,200 km^2 of land previously classified as steppes/pasture was reclassified as rocky/sandy. It is unclear whether this resulted from an intentional procedural change.

I'zaz Mantika. I'zaz Mantika borders Turkey in the north of Aleppo Mohafaza and is almost entirely covered by stabilization zone 1. Of a reported 1,550 km^2 total area, an average 1,080 km^2 was classified as cultivable, all of it cultivated. In addition to 65 km^2 irrigated, cultivated land included 970 km^2 of nonirrigated land and 40 km^2 fallow. Rainfed agriculture was focused on annual production with very limited fallowing. Rocky/sandy land averaged 380 km^2.

'Ifrin Mantika. 'Ifrin borders Turkey on two sides in the extreme northwest of the Syrian Arab Republic. It lies entirely in stabilization zone 1 and 1,280 km^2 of its 2,040 km^2 total area was classified as cultivable. All the cultivable land was cultivated, with 60 km^2 irrigated, 1,210 km^2 nonirrigated and no fallow. Forest covered 250 km^2 and rocky/sandy land averaged about 440 km^2.

Al-Bab Mantika. Nearly 94 percent (1,830 km^2) of Al-Bab's total area was classified as cultivable and all of it was cultivated. Cultivated land included 100 km^2 irrigated, 920 km^2 nonirrigated and 810 km^2 fallow. The nearly 1:1 nonirrigated:fallow ratio indicates the strong use of a crop-fallow rotation with some annual production for rainfed agriculture.

Minbej Mantika. Rainfed agriculture typifies the Minbej Mantika. Cultivable land averaged 2,320 km^2 or 84 percent of the subregion's 2,760 km^2 total area. All cultivable land was cultivated. The cultivated land was composed of 65 km^2 irrigated, 1,200 km^2 nonirrigated, and 1,050 km^2 fallow. Like Al-Bab Mantika, Minbej's nonirrigated:fallow ratio suggests extensive use of a crop-fallow rotation with limited annual production. This subregion also showed an average of 200 km^2 in water area and 180 km^2 in rocky/sandy land.

Jarablus Mantika. Jarablus borders Turkey in the northern section of Aleppo Mohafaza in stabilization zone 2. The total area was 640 km^2 of which 550 km^2 were cultivable, all cultivated. Cultivated land was divided with 30 km^2 irrigated, 350 km^2 nonirrigated, and 170 km^2 fallow. A general crop-crop-fallow rotation is implied for rainfed agriculture from the nonirrigated:fallow ratio of 2:1.

Ein al-Arab Mantika. Stabilization zones 2 and 3 cross Ein al-Arab. The subregion's 2,730 km^2 total area was dominated by two land use classifications, cultivable land (1,940 km^2) and rocky/sandy land (670 km^2). All cultivable land was cultivated, with 160 km^2 irrigated, 1,040 km^2 nonirrigated and 730 km^2 fallow. As in Al-Bab and Minbej Manatik, extensive use of a crop-fallow rotation is implied, with limited annual production. Note that the 160 km^2 of irrigated cultivated land is a relatively high level, possibly correlated with the nearly 30 km^2 of water area, but more likely indicative of the common use of well-pumped irrigation. Rocky/sandy land occupied 570 km^2.

Jabal Sam'an. Cultivable land in this Mantika totaled 2.015 km^2 in 1977, some 73 percent of the total land area, while steppes and pasture and rocks and sand accounted for most of the remainder. Of the cultivated land, the same land area as cultivable land, slightly more than 10 percent was irrigated. Over one third of the cultivated land was fallowed, indicating a crop fallow rotation for rainfed agriculture in the Mantika.

Safira Mantika. The combined classifications, steppes/pasture and rocky/sandy lands, totaled an average of 2,700 km^2 of Safira's 4,040 km^2 total area. Cultivable land totaled 1,320 km^2 and was all cultivated. Only 20 km^2 were irrigated while 680 km^2 were nonirrigated and 620 km^2 were fallowed. The near 1:1 nonirrigated:fallow land ratio indicates a crop-fallow rotation for rainfed agriculture in this subregion.

Al-Hasakeh Mohafaza

Al-Hasakeh, in the northeastern portion of the Syrian Arab Republic, is the third largest Mohafaza with an area of 23,330 km^2. Approximately one half lies in stabilization zones 1-3 and half in stabilization zones 4 and 5.

Nearly 14,600 km^2 is classified as cultivable land, with 92 percent or 13,440 km^2 cultivated. The region has the second largest area of irrigated agriculture in Syria, more than 800 km^2. Nonirrigated cultivated land has averaged 8,380 km^2 while fallow land has averaged 4,290 km^2. The resulting nonirrigated:fallow ratio is about 2:1, suggesting general use of a crop-crop-fallow rotation for rainfed agriculture.

The other land classification of significance is 8,090 km^2 of steppes/pasture. An apparent and possibly unexplainable procedural change is a 55 km^2 decrease in rocky/sandy land from 1976-1977 with a precisely corrsponding increase in buildings/roads.

Al-Hasakeh Mantika

Al-Hasakeh Mantika's 12,150 km^2 lie in the eastern sector of Syria bordering Iraq. Stabilization zones 3, 4, and 5 cover the Mantika. Steppes/pasture land was the largest classification with 7,000 km^2, followed by cultivable land with 4,740 km^2. The cultivated-not cultivated breakdown of cultivable land was very unstable, with more than 600 km^2 fluctuating, which carries over into the nonirrigated and fallow classifications. It can be asserted that irrigated cultivated land was approximately 370 km^2. Nonirrigated and fallow lands were too erratic to make a proper assessment, except that most nonirrigated land was cropped annually with limited fallowing. This may have resulted from land rotating in and out of cultivation in response to climatic conditions or may have resulted from procedural difficulties in data collection.

Al-Kamishli Mantika. Al-Kamishli Mantika borders Turkey and is covered mainly by stabilization zone 1. Cultivable land accounts for 99 percent (3,980 km^2) of the subregion's 4,020 km^2 total area. Although some inconsistency again exists in the cultivated-not cultivated classifications, they are not as severe as Al-Hasakeh Mantika. Basically, about 3,820 km^2 of cultivable land were cultivated. Approximately 180 km^2 were irrigated, probably using well-pumped irrigation since no water area was reported. The remainder of the cultivated land was divided between nonirrigated and fallow. The ratio of nonirrigated to fallow land indicates the mix of crop-fallow, crop-crop-fallow and crop-fallow-fallow rotations for rainfed agriculture.

Al-Malkia Mantika. Al-Malkia's 3,370 km^2 total area was mostly cultivable land (2,710 km^2). Again the cultivated-not cultivated mix in

cultivable land fluctuated. In this case, it appears that about 600 km^2 were reclassified from fallow land to not cultivated land. This was possibly due to a fallowing period longer than two agricultural seasons, which would alter its classification according to the definitions given. If such a procedural change were the case, then according to the 1977 information, 2,090 km^2 (77 percent of cultivable land) were cultivated. That included 15 km^2 of irrigated land, 1,580 km^2 nonirrigated and 490 km^2 in fallow. The nonirrigated:fallow ratio would suggest an annual cropping and crop-fallow rotation mixture for rainfed agriculture, which is totally incongruous with the long fallow period hypothesis made earlier. Further information is needed to assess the cultivable land use for Malkia Mantika properly.

Steppes/pasture consistently accounted for 480 km^2 and rocky/sandy land for 150 km^2 of the Mantika's total area.

Ras Al-Ain Mantika. Ras Al-Ain Mantika had 3,170 km^2 of its 3,800 km^2 total area classified as cultivable. Another 600 km^2 were classified as steppes/pasture land.

The breakdown of cultivable land indicates the same problems as the first three Manatik in Al-Hasakeh Mohafaza. Very general, an average of 3,080 km^2 were cultivated. Irrigated land averaged 230 km^2 while nonirrigated and fallow land combined to an average total of 2,850 km^2. A mix of crop-fallow, crop-crop-fallow, and crop-fallow-fallow rotations might approximate the nonirrigated:fallow land ratios for the two years considered in this assessment.

Al-Rakka Mohafaza

Al-Rakka Mohafaza, in the north central portion of the Syrian Arab Republic, is traversed by stabilization zones 2-5. The Euphrates River flows in a west-east path through the middle of the region. The Mohafaza's total area is 19,620 km^2 with an average of 7,250 km^2 classified as cultivable.

Cultivable land averaged 640 km^2 irrigated, 4,100 km^2 nonirrigated, and 2,480 km^2 in fallow. The resulting nonirrigated:fallow ratio of just under 2:1 indicates a crop-crop-fallow rotation in general use on rainfed agricultural operations. There is some hint in the short series of available information that both cultivable land and irrigated cultivated land have consistently decreased.

The largest single land classification in Al-Rakka is steppes/pasture with an average of 11,290 km^2. Since the majority of the Euphrates Dam Basin irrigation project is within Al-Rakka, the Mohafaza has the largest reported water area, more than 510 km^2, which is consistent with the importance of irrigated cultivated land.

Al-Rakka Mantika. Al-Rakka Mantika holds the Euphrates Basin Dam and its associated irrigation project. The subregion has a total area of 14,500 km^2 of which 4,420 km^2 were classified as cultivable in 1977. All but 20 km^2 of cultivable land was cultivated. Irrigated land totaled 450 km^2 while water area totaled 500 km^2. Nonirrigated cultivated land was 2,580 km^2 with 1,390 km^2 fallowed, which would indicate a general crop-crop-fallow rotation for rainfed agriculture. Since this Mantika lies in the arid stabilization zones 4 and 5, that rotation seems unlikely.

There were 9,070 km^2 classified as steppes/pasture in 1977, and an additional 310 km^2 of rocky/sandy land. Between 1976 and 1977 some 700 km^2 were transferred from the steppes/pasture classification to the cultivated land classification. This may indicate that new lands were brought into agricultural production, or it may represent a sheer procedural problem involving a 5 percent shift in reporting.

Tell Abiad Mantika. In 1977, 2,680 km^2 of Tell Abiad's 5,120 km^2 total area were classified as cultivable. Between 1976 and 1977, 810 km^2 of cultivable land were reclassified as steppes/pasture, resulting in a 1977 total for steppes/pasture of 2,340 km^2. Essentially all cultivable land in 1977 was cultivated, with 160 km^2 irrigated, 1,490 km^2 nonirrigated, and 1,020 km^2 fallow. This indicates the use of crop-fallow, crop-crop-fallow, and crop-fallow-fallow rotations for rainfed agriculture.

Deir-ez-Zor Mohafaza

Deir-ez-Zor covers a large expanse of eastern Syria, bordering Iraq, and is traversed from the northwest to the southeast by the Euphrates River. This Mohafaza is almost entirely within stabilization zone 5, the desert/steppe zone.

The second largest region with an area of 33,060 km^2, Deir-ez-Zor had only about 1,390 km^2 of cultivable land in 1977, of which 1,290 km^2 were cultivated.

Because it is an arid region with considerable access to the Euphrates River, Deir-ez-Zor maintained more than 860 km^2 of irrigated land; the largest area of irrigated agriculture in any region of Syria. There were only 430 km^2 of nonirrigated land and no reported fallow. In such a dry stabilization zone one would not expect cultivation of nonirrigated land without a fallowing rotation to reestablish soil moisture. In a procedural sense, therefore, the nonirrigated data are somewhat suspect.

The largest portions of land are in steppes/pasture (19,580 km^2 or 59 percent of total area) and rocky/sandy land (11,790 km^2 or 36 percent of total area). The 1977 data suggest an 80 km^2 increase in water area over 1976, but there is no corresponding response in irrigated cultivated land.

Deir-ez-Zor Mantika. Deir-ez-Zor Mantika has a total area of 13,600 km^2. It is covered by the arid stabilization zone 5, but has substantial irrigation in projects along the Euphrates River, which traverses the Mantika. Of the 910 km^2 of cultivable land, an average 880 km^2 were reported as cultivated. The mix of cultivated land finds 450 km^2 irrigated and 430 km^2 nonirrigated, with no fallow. The existence of such a large amount of non-irrigated land with no fallow in stabilization zone 5 does not seem plausible. It may indicate the presence of microclimate exceptions or unreported use of supplemental irrigation.

The largest areas of classification were steppes/pasture with 8,850 km^2 and rocky/sandy land with 3,650 km^2. Together these two classifications were 92 percent of Deir-ez-Zor's total area.

Al-Mayadin Mantika. Al-Mayadin Mantika is also traversed by the Euphrates River and covered entirely by stabilization zone 5, desert/steppe. The major portions of its 15,950 km^2 were 8,370 km^2 steppes/pasture and 7,310 km^2 rocky/sandy land. Cultivable land averaged 240 km^2, 210 km^2 of which was classified as cultivated. All the cultivated land was irrigated.

Al-bu Kamal Mantika. Al-bu Kamal Mantika is situated in the far south-eastern area of Deir-ez-Zor Mohafaza, bordering Iraq. It is virtually a copy of Al-Mayadin Mantika, except smaller. It is in stabilization zone 5 and the Euphrates River flows through the subarea. The 3,510 km^2 total area is dominated by 2,360 km^2 of steppes/pasture land and 870 km^2 of rocky/sandy land. Cultivated land averaged 230 km^2, all of which was irrigated.

C. Crop Use of Land

Cropping patterns among regions of the country, on irrigated and non-irrigated land, and between seasons provide an important perspective for analyzing agricultural production in Syria. In this section the data on current crop use of the land is based on a three-year (1975-1977) average, summarized at the National, regional (Mohafaza) and subregional (Mantika) levels. Summary tables with National and Mohafaza totals are given in Appendix 2, while the detailed tables with data on the Mantika level are located in the technical files of the sector assessment project.

National Summary

A total of 38,448 km^2 were used for crop production, about 15 percent (5,661 km^2) irrigated and the remainder (32,786 km^2) rainfed. Winter crops dominated the seasonal distribution with 29,607 km^2 or 77 percent of the total production area; summer crops occupied 5,206 km^2 (13.5 percent) and perennials 3,634 km^2 (9.5 percent). Irrigated summar crops (3,097 km^2) represented 59.5 percent of the summer crop area and over half of all irrigated area. Only 7.3 percent (2,171 km^2) of winter crops and 10.8 percent (394 km^2) of perennials were irrigated.

Winter crop dominance of the national use of cropland was primarily due to wheat and barley. Dryland local wheat varieties occupied 12,375 km^2, or 32.2 percent of all crop use of land nationally. Dryland barley was grown on 10,542 km^2, or 27.4 percent. An additional 1,842 km^2 of dryland Mexican wheat, 1,403 km^2 of irrigated Mexican wheat, 414 km^2 of local wheat, and 139 km^2 of irrigated barley raise the wheat-barley share of national crop use of land to 69.4 percent.

Other winter crops of importance were lentils (1,409 km^2) and chick-peas (546 km^2). Most of the area of these crops, 96 percent of the lentils and 99 percent of the chickpeas, was dryland.

Major summer crops, where only two crops exceeded 1 percent of the national crop use of land, were cotton (1,921 km^2), watermelon (799 km^2). sesame (377 km^2) and tomatoes (304 km^2). The fact that cotton was mostly irrigated accounts for crops being nearly 60 percent irrigated, although over half the tomatoes were also irrigated. Watermelon and sesame were primarily dryland crops, as were muskmelon (232 km^2), millet (223 km^2) and maize (218 km^2).

The major perennial crops were nonirrigated. Olives were grown on the greatest dryland area with 2,103 km^2, followed by grapes (901 km^2), figs 231 km^2) and apples (178 km^2). Apricots were an exception, with most of the 113 km^2 production area receiving irrigation.

Portions of the national crop use of land can be summarized by general categories as follows: irrigated winter crops, 5.6 percent; dryland winter crops, 71.4 percent; irrigated summer, 8.1 percent; dryland summer, 5.5 percent; irrigated perennials, 1 percent, and dryland perennials, 8.4 percent.

Over half the total area in crops was in three Mohafazat--Aleppo with 21.5 percent (8,269 km^2), Al-Hasakeh with 23.4 percent (8,979 km^2) and Al-Rakka with 11.8 percent (4,552 km^2). The remainder was distributed fairly evenly among the other Mohafazat, most of them ranging from 3 to 8 percent each. Quneitra, with 0.3 percent (131 km^2), was an exception, as was Damascus City, with less than .05 percent (14 km^2).

Winter crop distribution was in the same pattern as total crop area. The same three Mohafazat had over 10 percent each: Aleppo with 21.5 percent (6,357 km^2); Al-Hasakeh with 28.4 percent (8,407 km^2), and Al-Rakka with 14.1 percent (4,167 km^2). Other Mohafazat ranged from 2 to 7 percent each, with the same two exceptions, Quneitra with 0.4 percent (107 km^2) and Damascus City with less than .05 percent (4 km^2).

The distribution of summer crops was slightly different. Two different Mohafazat exceeded 10 percent of the total: Idleb with 11.7 percent (608 km^2) and Deir-ez-Zor with 10.9 percent (566 km^2), along with Al-Hasakeh at 10.7 percent (556 km^2) and Aleppo with 19.6 percent (1,020 km^2). Other Mohafazat ranged from 1 to 8 percent of the summer crop area total, with the same exceptions as before, Quneitra with 0.2 percent and Damascus City with less than .05 percent.

Distribution of perennial crops was substantially different from the total crop and winter crop patterns. Three Mohafazat that were important in those patterns, Al-Hasakeh, Al-Rakka and Deir-ez-Zor, contributed less than 1 percent each to the perennial crop area. The most important Mohafazat were Aleppo with 24.5 percent 891 km^2), Idleb with 23.5 percent (853 km^2), Tartous with 17.2 percent (626 km^2) and Damascus with 9.6 percent (349 km^2).

The 5,661 km^2 of irrigated crop area were distributed in the same way as total crop area. As would be expected, the dry eastern Mohafazat, Al-Hasakeh, Al-Rakka and Deir-ez-Zor all had substantial irrigated area, 13.8 percent (779 km^2), 12.2 percent (692 km^2), and 18.9 percent (1,071 km^2), respectively. Two western Mohafazat also had substantial portions of the total irrigated area, Aleppo with 13.5 percent (765 km^2), and Damascus with 11.3 percent (638 km^2). Al-Sweida had no reported irrigated area, while Damascus City, with all 14 km^2 of its crop area irrigated, contributed 0.2 percent of the irrigated area total.

Three Mohafazat together accounted for nearly 60 percent of the nonirrigated crop area. Aleppo grew nonirrigated crops on 7,504 km^2 which was 22.9 percent of the total; Al-Hasakeh had 8,199 km^2, or a full 25 percent, and Al-Rakka contributed 3,860 km^2, or 11.8 percent. The other Mohafazat contributed from 1 to 7 percent each, except for Quneitra with 0.4 percent and Damascus City which had no dryland crops.

Mohafaza Summaries

Damascus City

Damascus City Mohafaza, all in one Mantika, had 14 km^2 of crop area, all of it irrigated. The largest area, 41.9 percent or 6 km^2, was devoted to perennials, primarily olives (4 km^2). Summer crops were next in importance (29.7 percent), occupying 4 km^2. The most important summer crops were tomatoes (1.5 km^2), eggplant (.8 km^2) and dry onions (.6 km^2). Winter crops accounted for 28.4 percent of the area (3.8 km^2) with no single dominant crop. Broad beans (.9 km^2) and cauliflower (.8 km^2) accounted for nearly half the area, but were followed closely by cabbage (.7 km^2) and wheat (local and Mexican) with another .7 km^2.

Damascus

Over 56 percent (671 km^2) of the total crop area of 1,195 km^2 in Damascus Mohafaza was devoted to winter crops. Irrigation was practiced on 37.5 percent of the winter crop area, much of that in Duma Mantika. Local wheat and barley were the dominant winter crops with 266 km^2 and 229 km^2 respectively.

Summer crops, a total of 175 km^2, were almost totally irrigated (99.2 percent). Cotton (30 km^2), tomatoes (27 km^2) and potatoes 25 km^2) were the main summer crops, but several other crops were also important.

Perennial crop area was second in importance in the Mohafaza, with 29.2 percent (349 km^2) of the crop area. Irrigation was used on 60.7 percent of that area and was particularly important on olives, apricots and apples. Grapes (119 km^2), apples (68 km^2) and apricots (60 km^2) were the leading perennial crops in the Mohafaza totals.

Most of the winter crop area in the nine Manatik of Damascus Mohafaza was specialized in the production of local wheat and barley. In Damascus, Duma, Al-Quteifeh and Daraya Manatik, most local wheat was irrigated; while in Tall, Qatana, Al-Zabadani, Al-Nabek and Yabarod, the wheat was dryland. Although barley was produced by dryland farming nearly everywhere, some was irrigated in Duma and Daraya Manatik. Qatana also planted dryland chickpeas on 19 km^2.

Damascus and Duma Manatik were the source of most summer crops. Irrigated cotton was important in both Manatik. Damascus Mantika was the major source of potatoes, grown on irrigated land, while tomatoes, also irrigated, were raised in Duma Mantika.

Grapes were the single most important perennial crop in this Mohafaza, and were important in Tall, Al-Zabadani, Al-Nabek, Al-Quteifeh, Daraya and Yabarod Manatik. Daraya was the only subregion which used sustantial irrigation on grapes. Irrigated apples were important in Qatana and Al-Zabadani; irrigated apricots in Damascus, Duma, and Qatana Manatik; irrigated olives in Damascus and Duma; and nonirrigated figs in Tall, Al-Zabadani and Al-Quteifeh.

Dar'a

Dar'a Mohafaza is primarily a winter crop area, with 89.2 percent of its 1,407 km^2 devoted to these crops. Only 7.2 percent of Dar'a's total crop area and only 2.4 percent of the winter crop area was irrigated. About half of the 125 km^2 of summer crops were irrigated. Only 27 km^2 of its crop area was devoted to perennials and less than 40 percent of that was irrigated.

The important winter crops are primarily nonirrigated. Dryland wheat, barley, lentils, and chickpeas were particularly important in Dar'a and Izra' Manatik. Wheat occupied the largest winter crop area in both Manatik. The second largest crop areas were chickpeas in Izra' and barley in Dar'a.

Dar'a Mantika's leading summer crop was irrigated tomatoes (16 km^2) and Izra' specialized in watermelon (26 km^2). The leading perennial in both Manatik was olives.

Al-Sweida

Al-Sweida Mohafaza was unique in having no reported irrigated area. Winter crops were very important in the region, occupying 75.5 percent (690 km^2) of the 915 km^2 of crop area. Local wheat, barley, and chickpeas were leading winter crops grown on 1,366 km^2, 134 km^2, and 101 km^2 respectively. Summer crops occupied only 5.9 percent (54 km^2) of the crop area, dominated by watermelon (29 km^2) and tomatoes (15 km^2). Grapes occupied 126 km^2 of the 171 km^2 of perennials.

Winter crops were evenly distributed among Al-Sweida's three Manatik. Salkhad had 253 km^2, Shahba had 220 km^2 and Al-Sweida had 217 km^2. Local wheat was the leading winter crop throughout the Mohafaza; barley was second in Al-Sweida and Shahba, with chikpeas second in Salkhad.

Watermelon and tomatoes were the dominant summer crops in all three Manatik, with Shahba producing on the largest area in both crops, 16 km^2 and 8 km^2 respectively. Grapes dominated perennial crop area in all three Manatik, 98 km^2 in Al-Sweida, 13 km^2 in Shahba and 15 km^2 in Salkhad.

Quneitra

Winter crops were grown on 107 km^2 (82 percent) of the 131 km^2 total crop area. Summer crops occupied 9.2 percent (12 km^2) and perennials 8.7 percent (11 km^2). Irrigation was practiced on 5.4 percent of the winter crop area, 38 percent of the summer crops, and none of the perennials. Leading winter crops were local wheat (53 km^2) and chickpeas (27 km^2), all reported in Quneitra Mantika. No crop area was reported for Al-Zaweieh Mantika.

Leading summer crops were dryland millet (6 km^2), irrigated tomatoes (2 km^2) and irrigated maize (2 km^2). The major perennial crops were dryland grapes (7.5 km^2) and dryland figs (3 km^2).

Homs

Nearly 75 percent of the 2,725 km^2 of crop area in Homs Mohafaza was devoted to winter crops. The most important were dryland local wheat (918 km^2) and dryland barley (661 km^2). The largest wheat areas were in Homs, Talkalakh and Al-Mokhram Manatik with 399 km^2, 132 km^2 and 184 km^2, respectively. Homs and Al-Mokhram Manatik were the leading barley producers, with 369 km^2 and 176 km^2 respectively. Only 5.5 percent of all winter crop area was irrigated.

The region planted summer crops on 433 km^2 (15.9 percent) of the crop area, and 65.4 percent of that was irrigated. Irrigated cotton, maize, sugar beets, potatoes, and dryland millet were all important. There were 46 km^2 of irrigated cotton, mostly in Homs (17 km^2) and Al-Rastan (23 km^2) Manatik. Irrigated maize (47 km^2) was produced mostly in Talkalakh (21 km^2) and Al-Koseir (17 km^2). Irrigated sugar beets (37 km^2) were planted primar-

ily in Al-Rastan (18 km^2) and Homs (11 km^2). Most of the irrigated potatoes (32 km^2) were grown in Al-Koseir (21 km^2). The 95 km^2 of dryland millet were primarily located in Talkalakh (57 km^2) and Homs (31 km^2).

Perennial crops were grown on 256 km^2 (9.4 percent of the total crop area), with 43 km^2 irrigated. Dryland grapes dominated the area, being grown on 176 km^2, mostly in Homs (91 km^2), Talkalakh (37 km^2), and Al-Mokhram (40 km^2) Manatik. Dryland olives (30 km^2) were also important and were grown almost entirely (29 km^2) in Talkalakh Mantika.

Hama

Hama's 2,658 km^2 total crop area was 81.8 percent (2,173 km^2) winter crops, 12.6 percent (334 km^2) summer crops and 5.7 percent (151 km^2) perennials. Irrigation was practiced on 8 percent of the winter crop area, 40.8 percent of the summer crop area and 13.8 percent of the perennials, or in total, 12.5 percent of all crop area.

Winter crop area was dominated by dryland wheat (890 km^2) and barley (883 km^2). Most were planted in Hama and Al-Salamiya Manatik. Wheat area was evenly distributed, with Hama Mantika raising 407 km^2 and Al-Salamiya planting 408 km^2. Hama Mantika also planted 50 km^2 of dryland lentils and 44 km^2 of rambling vetch.

A number of summer crops were important in Hama Mohafaza. Dominant crops were dryland watermelons (98 km^2) and irrigated cotton (76 km^2), together accounting for slightly over half of the 334 km^2 summer crop area. Most of the watermelon area was in Hama Mantika (89 km^2), while irrigated cotton was divided among Hama (53 km^2), Al-Salamiya (15 km^2) and Mahrda (13 km^2) Manatik.

Dryland millet (26 km^2), dryland cucumbers (15 km^2) and irrigated dry onions (10 km^2) were significant summer crops. Most of the millet (21 km^2) was planted in Hama Mantika, as were most of the dryland cucumbers. Hama Mantika also contributed over half the irrigated dry onion area (6 km^2).

Perennial crop area was about 68 percent dryland grapes, found particularly in Hama (68 km^2), Misiaf (19 km^2) and Mahrda (21 km^2) Manatik. Non-irrigated figs were grown on 13 km^2 of Misiaf and 6 km^2 of Hama.

Al-Ghab

Winter crops were planted on 378 km^2 or 47.4 percent of Al-Ghab's 796 km^2 crop area. Summer crops occupied 405 km^2 (50.9 percent) and 13 km^2 (1.7 percent) were devoted to perennials. Only 7 percent of the winter crop area was irrigated, but a relatively high 78.1 percent of summer crop area and 19.1 percent of the perennials led to an average of 43.4 percent of all crop area receiving irrigation.

The dominant winter crop was dryland Mexican wheat, with 267 km^2. By comparison, dryland local wheat occupied just 36 km^2, dryland lentils accounted for another 15 km^2, and nonirrigated barley for 14 km^2.

The most important summer crop was irrigated cotton (190 km^2). An additional 20 km^2 were devoted to dryland cotton. Irrigated maize was grown on 53 km^2, and nonirrigated watermelons occupied 29 km^2.

The major perennial crop was nonirrigated grapes (7 km^2), although nonirrigated figs (2 km^2) and olives (1 km^2) were significant.

Tartous

Tartous Mohafaza is an important perennial crop area with 17.2 percent of the national total perennial area. Over 46 percent (626 km^2) of its 1,353 km^2 crop area was planted in perennials. Winter crops occupied 34.4 percent (466 km^2) of its crop area, and summer crops accounted for 19.3 percent (261 km^2). Only 1.8 percent of the perennial crop area and 5.8 percent of the winter crop area was irrigated. More than 60 percent of the summer crop area was irrigated.

Winter crop area, mostly nonirrigated, was dominated by wheat. Dryland local wheat (273 km^2), plus nonirrigated Mexican wheat totaled 329 km^2 or 71 percent of the winter crop area.

All Manatik shared in wheat production. Tartous Mantika had 75 km^2 of combined dryland local and Mexican wheat, Banias had 105 km^2, Safita planted 79 km^2, Draikish 35 km^2 and Al-Shekh Badr 37 km^2. Barley was grown primarily in Tartous (10 km^2) and Banias (14 km^2) Manatik. Chick-peas were produced on 10 km^2 in Tartous and 5 km^2 in Banias.

Summer crops were diverse with respect to both area and irrigation. The primary irrigated crops were peanuts (70 km^2), cucumbers (31 km^2), and tomatoes (19 km^2). Tartous and Banias Manatik were the producers of most of the peanuts (53 km^2 and 14 km^2, respectively), and cucumbers (26 km^2 and 4 km^2, respectively). The same two Manatik also dominated tomato production.

Nonirrigated summer crops of importance were millet (28 km^2), tobacco (21 km^2) and maize (20 km^2). Tartous and Banias Manatik were again prominent, this time in millet with 15 km^2 and 11 km^2, respectively. Tobacco area was mostly divided between Banias (12 km^2) and Al-Shekh Badr (6 km^2). Al-Shekh Badr led in dryland maize with 7 km^2, followed by Safita with 6 km^2 and Draikish with 3 km^2.

The dominant perennial crop was nonirrigated olives (578 km^2). The leading Mantika in olive area was Safita with 235 km^2, followed by Tartous (197 km^2), Banias (65 km^2), Draikish (56 km^2), and Al-Shekh Badr (27 km^2).

Lattakia Mohafaza

Lattakia Mohafaza, like Al-Ghab, devoted less than half of its 823 km^2 total crop area to winter crops. Only 1 percent of the 313 km^2 in winter crops was irrigated. Summer crops occupied 271 km^2 (33.0 percent of the total crop area) with 125 km^2 irrigated. Perennial crops used 238 km^2, of which 3.2 percent or less than 8 km^2 were irrigated. Wheat (local plus Mexican varieties), tobacco, and olives combined to account for 509 km^2 of the 687 km^2 total nonirrigated crop land. Peanuts, sugar beets, squash and haricot beans (all summer crops) added to 103 km^2 of the 138 km^2 total irrigated crop land. Lattakia had the most balanced distribution of crop areas of all Mohafazat--38 percent in winter crops, 33 percent in summer crops and 29 percent in perennials.

Winter crops were distributed fairly evenly among Lattakia Mohafaza's four Manatik. Nonirrigated wheat (both varieties) was the dominant winter crop, ranging from 41 km^2 in Al-Qardaha to 72 km^2 in Jableh. Nonirrigated tobacco was generally the dominant summer crop, ranging from 14 km^2 in Al-Qardaha to 30 km^2 in Jableh. Summer crop specialization in irrigated peanuts, sugar beets and squash characterized Jableh and, to a lesser extent, Lattakia Manatik. Lattakia and Jableh specialized in perennial crop area with 107 km^2 and 49 km^2, respectively, devoted to nonirrigated production of olives. Al-Hiffeh and Al-Qardaha also showed some area specialization in nonirrigated olives. In addition Al-Hiffeh showed specialization in nonirrigated apples.

Idleb Mohafaza

Winter crops and perennials were most important in Idleb Mohafaza. Winter crops occupied 1,631 km^2 or 52.7 percent of the 3,092 km^2 total crop area. Perennials were produced on 853 km^2 which was 23.5 percent of the total national area devoted to perennials. Approximately 3 percent of winter crops and 1 percent of perennials were irrigated. Dominant winter crops, all nonirrigated, included local and Mexican wheat (803 km^2), barley (467 km^2) and lentils (229 km^2). Dominant perennials, also all nonirrigated, were olives (620 km^2), grapes (87 km^2) and figs (92 km^2).

Summer crops were grown on 608 km^2 and 13.8 percent of that area (84 km^2) was irrigated. This summer crop area amounted to nearly 12 percent of the total national crop area. Nonirrigated watermelon (218 km^2) was the largest single summer crop area. Summer crop specialization also included dryland sesame (88 km^2), muskmelon (51 km^2) and tobacco (48 km^2), with combined dryland and irrigated cotton adding more than 96 km^2.

Crop specialization, with the exception of cotton in Idleb Mantika, in Idleb Mohafaza's five Manatik was confined to nonirrigated crop area. Wheat and barley were particularly important winter crops, especially in Ma'arrat-AlNu'man (414 km^2 and 253 km^2, respectively) and in Idleb 213 km^2 and 167 km^2, respectively). Ma'arrat-Al-Nu'man and Idleb Manatik also specialized in winter, nonirrigated lentils with 103 km^2 and 109 km^2, respectively. Winter crop specialization included rambling vetch in Harem and Jisr-Al-Shughour Manatik.

Summer crop specialization was much more diverse. Idleb had watermelons (133 km^2) and cotton (66 km^2 combined irrigated and nonirrigated), Harem had tobacco (18 km^2) and Jisr-Al-Shughour had both tobacco (15 km^2) and millet (10 km^2). Ma'arrat-Al-Nu'man had sesame (81 km^2) and watermelon (75 km^2). Ariha had no summer crop specialization.

Perennial crop specialization was dominated by olives which ranged from 44 km^2 in Ma'arrat-Al-Nu'man to 247 km^2 in Harem. Apples and figs were major perennials in Jisr-Al-Shughour and Ma'arrat-Al-Nu'man, where grapes were another specialty.

Aleppo

Aleppo was one of the most important Mohafazat in all crop area categories. The aohafaza included 21.5 percent of the total crop area, 21.5 percent of the winter crop area, 19.6 percent of the summer crop area, and 24.5 percent of the perennial crop area in the Syrian Arab Republic. The region's 8,269 km^2 of crop area was divided: 76.9 percent (6.357 km^2) to winter crops, 12.3 percent (1,020 km^2) to summer crops and 10.8 percent (891 km^2) to perennials. Irrigation was used on 5.3 percent of the winter crop area, 39 percent of the summer crops, and 3.7 percent of the perennials.

Winter crop area was dominated by dryland local wheat (2,840 km^2) and dryland barley (2,154 km^2). All eight Manatik devoted substantial land to local wheat. The leaders were Ein-al-Arab with 613 km^2, Minbej with 579 km^2, Jabal Sam'an with 497 km^2 and Al-Bab with 491 km^2. Five Manatik were barley areas. Minbej with 595 km^2, Jabal Sam'an with 436 km^2, Safira with 407 km^2, Ein-al-Arab with 367 km^2, and Al-Bab with 330 km^2.

Dryland lentils were also an important winter crop in Aleppo Mohafaza. I'zaz Mantika had the largest area with 171 km^2, followed by Jabal Sam'an with 140 km^2 and 'Ifrin with 82 km^2. I'zaz and 'Ifrin also planted 185 km^2 and 167 km^2, respectively, of Mexican wheat.

Irrigated cotton was one of several important summer crops. Ein-al-Arab showed 194 km^2 of the 303 km^2 of irrigated cotton in the Mohafaza, followed by Jabal Sam'an with 78 km^2, and Al-Bab with 34 km^2. Nonirrigated watermelon area (223 km^2) was important in I'zaz (125 km^2), Jabal Sam'an (45 km^2) and 'Ifrin (40 km^2). Dryland sesame in 'Ifrin (34 km^2), Al-Bab (28 km^2), Jarablus (23 km^2) and I'zaz (21 km^2) were also important as was nonirrigated muskmelon from 'Ifrin (39 km^2), I'zaz (36 km^2) and Jabal Sam'an (21 km^2).

The leading perennial crop was nonirrigated olives, 616 km^2, found primarily in 'Ifrin Mantika (538 km^2), with I'zaz (40 km^2) and Jabal Sam'an (34 km^2) Manatik growing most of the rest. Nonirrigated grapes were important in 'Ifrin (95 km^2), I'zaz (51 km^2), Jarablus (24 km^2), Jabal Sam'an (19 km^2) and Al-Bab (17 km^2). Dryland figs and irrigated pomegranates were important in Jabal Sam'an (12 km^2 and 9 km^2, respectively).

Al-Hasakeh

Al-Hasakeh Mohafaza's 8,979 km^2 of crop area was the largest of any Mohafaza in the country. Winter crops were planted on 8,407 km^2 which accounted for 23.4 percent of the national winter crop area. Summer crops occupied 556 km^2 and perennials were grown on only 15 km^2. Only 4.3 percent, just 362 km^2, of the winter crop area was irrigated while 406 km^2 of summer crops were irrigated. About 11 km^2 of the perennial crop area was irrigated.

Winter crop area was dominated by dryland wheat and barley. Nonirrigated local wheat was grown on 3,964 km^2, with all four Manatik planting large areas. Al-Hasakeh Mantika grew 1,228 km^2, Al-Kamishli had 1,041 km^2, Ras Al-Ain planted 979 km^2, and Al-Malkia had 716 km^2. Dryland Mexican wheat also contributed substantially to the dominance of wheat with 374 km^2 grown in Al-Malkia Mantika and 264 km^2 in Al-Kamishli accounting for most of the area. In addition, 162 km^2 of irrigated Mexican wheat in Al-Hasakeh Mantika, 99 km^2 in Al-Kamishli and 59 km^2 in Ras Al-Ain provided an additional boost to the total wheat area.

Dryland barley was also a very important winter crop in Al-Hasakeh Mohafaza (29 percent of the national area) occupying 3,013 km^2. Production area was largest in Al-Hasakeh Mantika with 1,730 km^2, followed by Al-Kamishli (662 km^2), Ras Al-Ain (516 km^2) and Al-Malkia (105 km^2).

Over 20 percent of the national dryland lentil area was in Al-Hasakeh Mohafaza. The 301 km^2 of lentils were mostly grown in Al-Kamishli (205 km^2), with 73 km^2 more in Al-Malkia and 21 km^2 in Ras Al-Ain.

Irrigated cotton (371 km^2), dryland watermelon (101 km^2) and dryland muskmelon (42 km^2) dominated the summer crop picture. Al-Hasakeh Mantika led the irrigated cotton area with 198 km^2, followed by 87 km^2 in Al-Kamishli, and 80 km^2 in Ras Al Ain. Al-Kamishli and Al-Malkia dominated the dryland watermelon and muskmelon. Al-Kamishli planted 48 km^2 to dryland watermelon and 22 km^2 to dryland muskmelon. Al-Malkia grew 47 km^2 of watermelon without irrigation and 18 km^2 of muskmelon, also dryland.

The small perennial crop area was primarily devoted to grapes and apricots. About 4 km^2 of grapes were irrigated, most located in Al-Hasakeh Mantika; and another 4 km^2 were dryland, found in Al-Malkia and Al-Kamishli. About 3 km^2 of irrigated apricots were grown, 2 km^2 of these were in Al-Hasakeh Mantika.

Al-Rakka

Al-Rakka Mohafaza devoted 91.5 percent or 4,167 km^2 of a 4,552 km^2 total crop area to winter crops, of which 7.4 percent of 307 km^2 was irrigated. Summer crops were planted on 381 km^2, essentially all irrigated. Perennial crops were minor, occupying only 4 km^2, all irrigated.

The crucial winter crop area was completely dominated by wheat and barley. Dryland wheat, all local variety, was grown on 1,253 km^2, with Tell Abiad Mantika planting 717 km^2 and Al-Rakka Mantika 536 km^2. Irrigated Mexican wheat was grown on 164 km^2 in Al-Rakka Mantika and 65 km^2 in Tell Abiad Mantika. Irrigated local wheat totaled an additional 56 km^2 for the Mohafaza. Dryland Mexican varieties were grown on 31 km^2 in Tell Abiad and 25 km^2 in Al-Rakka Mantika. Dryland barley occupied 2,575 km^2 in the Mohafaza, 1,481 km^2 in Al-Rakka Mantika and 1,094 km^2 in Tell Abiad.

Irrigated cotton occupied most of the summer crop area (316 km^2), Al-Rakka Mantika planting 245 km^2 and Tell Abiad growing 71 km^2. About 20 km^2 of irrigated sesame in Al-Rakka Mantika and 5 km^2 in Tell Abiad were also important.

Limited perennial crop area (4 km^2) was divided in small portions among several crops--irrigated apricots, irrigated grapes, peaches, and pomegranates.

Deir-ez-Zor

The Mohafaza shows the effects of its dry, eastern climate through the use of irrigation. Not only are all summer and perennial crops irrigated, but over half of the winter crops are also irrigated. Winter crops occupied only 952 km^2, or nearly 62 percent of the 1,540 km^2 crop area which is low for the eastern Mohafazat. Summer crops were grown on 36.8 percent (566 km^2) which is high for that part of the country. Perennial crops occupied 22 km^2, only 1.4 percent of the area.

Dominant winter crops were wheat and barley. Dryland local wheat was planted on 233 km^2, 220 km^2 of it in Deir-ez-Zor Mantika. There were 38 km^2 of local wheat varieties irrigated, 18 km^2 in Deir-ez-Zor Mantika, 10 km^2 in Al-Mayadin and 10 km^2 in Al-bu·Kamal. In addition, 391 km^2 of Mexican varieties were under irrigation, 184 km^2 in Deir-ez-Zor Mantika, 90 km^2 in Al-Mayadin and 116 km^2 in Al-bu Kamal.

Dryland barley was grown on 231 km^2 in Deir-ez-Zor Mantika and some irrigated barley was grown in all three Manatik - 18 km^2 in Deir-ez-Zor, 12 km^2 in Al-Mayadin and 13 km^2 in Al-bu Kamal.

The major summer crop was 396 km^2 of irrigated cotton, 214 km^2 in Deir-ez-Zor, 194 km^2 in Al-bu Kamal and 78 km^2 in Al-Mayadin. Sesame occupied 72 km^2 with 38 km^2 in Deir-ez-Zor Mantika, 21 km^2 in Al-bu Kamal and 13 km^2 in Al-Mayadin.

The limited perennial crop area, all irrigated, was mostly devoted to apricots (9 km^2), apples (5 km^2), and plums (4 km^2). Deir-ez-Zor led the producing Manatik with 6 km^2 of apricots, 3 km^2 of apples and 3 km^2 of plums.

D. Land Use Intensity

The extent to which agricultural land available for crop production is actually used for this purpose may be assessed with land-use intensity ratios. These ratios were calculated for the National, Mohafaza and Mantika administrative areas of Syria, using the data on general and crop use of land previously discussed in sections B and C. The National and Mohafaza ratios are given in Appendix 2, while the ratios on the Mantika level are located in the technical files of the sector assessment project.

Before assessing these ratios at the National and Mohafaza levels, this section first outlines steps in their calculation and interpretion.

Calculation of Use-Intensity Ratios

Use-intensity ratios were calculated by comparing crop use of the land to cultivated land. Crop use of the land was partitioned by production system (irrigated or nonirrigated) and by season of crop planting (winter, summer, and perennial). Cultivated land use was partitioned into irrigated, nonirrigated and fallow land. Four ratios for nonirrigated land and two for irrigated land were calculated. Where possible, averages and ratios were calculated using 1975, 1976, and 1977 Mantika data. Mantika data was then aggregated to calculate mohafaza and national averages and ratios.

The following is an example calculation of the summer, irrigated ratio for 1977 in Al-Rastan Mantika, Homs Mohafaza, see tabular data at end of Appendix 2. For 1977, Al-Rastan Mantika summer irrigated crops subtotaled 8,155 hectares and perennial (fruit), irrigated crops subtotaled 455 hectares. For Al-Rastan Mantika in 1977, irrigated, cultivated land subtotaled to 10,954 hectares. The ratio for this example (I.B.) is:

$$\frac{\text{Summer}}{\text{Cultivated-Fruit}}$$

Since this is the irrigated, summer ratio the latter ratio means:

$$\frac{\text{Irrigated Summer Crop Subtotal for 1977}}{\text{Irrigated Cultivated Land for 1977 - Irrigated Perennial Subtotal for 1977}}$$

Substituting the appropriate values, the irrigated, summer ratio for Al-Rastan is:

$$\frac{\text{8,155 hectares}}{\text{10,954 hectares - 455 hectares}} = .777$$

Interpretation of Use-Intensity Ratios

The use-intensity ratios were developed to assit agricultural planners in assessing the land resource base. The ratios are particularly helpful for identifying areas where multiple cropping and intercropping may be practiced, for identifying possible crop rotations, for identifying resource constraints (particularly the suitability of irrigation water supplies), and for identifying possible procedural problems in the collection and reporting of land use and crop use of the land data.

In the example, a use-intensity ratio of .777 for irrigated, summer crops in Al-Rastan was calculated. A corresponding ratio of .264 was calculated for irrigated, winter crops. The first observation in interpreting the ratios is that irrigation is much more extensive for summer crops, nearly triple the winter crop irrigated area. The second observation is that the two ratios sum to 1.041 which would imply that slightly more than 100 percent of the irrigated cultivated land (other than perennials) was actually cropped. This may have resulted from limited multiple cropping of summer crops following winter crops on the same land.

By contrast, the same two ratios add to .728 for Al-Mokhram Mantika, Homs Mohafaza. This suggests that there may be some problem with irrigation. The actual problem (interrupted supply and/or delivery system) is not discernible from the information used to calculate the use-intensity ratios. Another possible explanation for the ratio being substantially less than one is a reporting problem in the data collection. If the area in question lies in a transitional rainfall zone, it may happen that, in years of particularly good rainfall, an in-place irrigation system would not be fully necessary. The land would still be classified as irrigated cultivated land but some of the cropped area would be rainfed and reported as nonirrigated cropped land. Ordinarily, nonirrigated cropped land in Syria's administrative units is far more extensive than irrigated cropped land. Consequently, a shift of some cropped area from irrigated to rainfed agricultural production (even though an irrigation system is in place) may not be detectable by examining the nonirrigated use-intensity ratio for a corresponding increase. If the irrigation system was used only on a supplemental basis, the cropped area might be reported as rainfed or the land might be classified as nonirrigated cultivated land. The wide variety of possible interpretations merely accentuates the agricultural planners' need for further information.

There are two sets of nonirrigated, seasonal use-intensity ratios. The difference is that the second (II.) adds fallow land to nonirrigated cultivated land to form the base for rainfed agriculture while the first (I.B.) does not. Al-Rastan Mantika provides a good example of their interpretations. The two sets of ratios for 1977 are:

I.B.	Nonirrigated	Summer	.085
		Winter	.885
II.	Nonirrigated with fallow	Summer	.045
		Winter	.469

The I.B. set of ratios add to .970, indicating that slightly less than 100 percent of nonirrigated cultivated land was actually planted. Land classified as nonirrigated cultivated may not be planted, particularly winter crops, if there is a rainfall deficiency at the time of planting. However, when the sum is so close to 1.00, the difference may result from reporting discrepancies. These ratios also illustrate that the rainfed agricultural production is almost exclusively a winter crop practice.

The II. set of ratios were calculated using fallow land as a dryland agricultural practice and their interpretation gives a clue to the type of crop rotations practiced in a region. In this case, the sum of the ratios is .514 and, in simplified terms, the ratios are calculated as:

$$\frac{\text{cropped land}}{\text{cultivated land + fallow land}}$$

This suggests a crop-fallow rotation as the dominant rainfed agricultural practice. This does not suggest the absence of continuous production or crop-crop-fallow and crop-fallow-fallow rotations.

It should be recognized that all ratios will be affected by the use of only major winter, summer and perennial crops. A full accounting of all crops would produce variable effects by Mantika in the computation of the use-intensity ratios.

National Summary

While the crop area summary is useful as a capsule of major agricultural crop production, the use-intensity ratios are of limited value at the highly aggregate, National level. The sum of the irrigated seasonal averages (.630 + .441 = 1.071) indicates limited practice of multiple cropping on irrigated land, see Appendix 2. The nonirrigated sums indicate that, on the average, 98 percent of available nonirrigated cultivated land was planted and that fallowing was an extensive agricultural practice on nonirrigated cultivated lands.

Mohafaza Summaries[1/]

Damascus City

Damascus City Mohafaza mainly produces vegetables, both in winter and summer. Summer vegetables are reported to be heavily intercropped and often follow winter vegetables on the same land. The cultivated land is all irrigated, usually pumped from wells in summer.

Average use-intensity ratios for irrigated production were .659 for summer and .643 for winter, see Appendix 2. Their sum, 1.302, indicates a 130 percent use of irrigated land and supports the high intensification plan developed by agricultural planners for the area. Plans recommend intensive cultivation for two to three years then return to nonintensive use (perhaps just one non-intercropped vegetable) for one year.

Damascus

Limited intensive vegetable production (intercropping and multiple cropping) occurs in Damascus Mohafaza on irrigated land. However, the combined average ratios (summer = .360, winter = .523) is .883 which would suggest less than full utilization of irrigated land. Irrigation water is reportedly used to capacity but, for certain Manatik, there is a shortage although the land remains defined as irrigated. An examination of the ratios for the Manatik in Damascus Mohafaz a reveals that water shortage for irrigation may be more prevalent than currently thought. Only Daraya Mantika with a ratio of 1.771 exceeds full utilization of irrigated, cultivated land and Damascus Mantika with a ratio of .969 approaches full utilization. Acutre shortages are indicated by .433 and .579 ratios for Al-Zabadani and Yabarod Manatik. A ratio range from .733 to .891 for the remainder of the Damascus Manatik further suggests irrigation water shortage problems.

Dryland agricultural production, almost solely winter crops, is practiced using a crop-fallow rotation with Damascus Mohafaza's average ratio of .541 with fallow included. With the exception of Duma, the average ratios range from .437 in Yabarod to .786 in Al-Zabadani. The ratio for Duma Mantika (1.583) is extremely high. With no reported fallow land and a relatively small nonirrigated area, it is suspected that a procedural, reporting problem may have caused the high dryland ratios for Duma.

1/ Much of the narrative for these summaries was developed from discussions with planning officials in the Ministry of Agriculture and Agrarian Reform, Syrian Arab Republic.

Dar'a

Intercropping and multiple cropping are not practiced in Dar'a Mohafaza. There is not sufficient capacity under current irrigation projects to irrigate all irrigated cropland, as indicated by the combined winter/summer .869 ratios. This ratio was affected by an apparent data inconsistency for Izra' Mantika in 1976. The reported 3,553 hectares in irrigated watermelons, perhaps an unsuccessful experiment as illustrated by a harvest of only 50 metric tons, were never translated to and reported in the irrigated cultivated land classification. The result was inordinately high summer ratios for Izra' Mantika and Dar'a Mohafaza in 1976. This also caused the Mohafaza summer average to be too high, which also made the combined winter/summer ratio (.869) too high. Setting the 1976 irrigated watermelon area to zero, the recalculated Mohafaza combined winter/summer ratio reduces to .748, indicating a more acute irrigation water shortage.

A crop-fallow rotation is generally practiced for nonirrigated agricultural production, as shown by the .512 combined winter/summer ratio with fallow. Production is almost entirely winter crops, primarily wheat, barley, chickpeas and lentils. Ratios for Dar'a and Izra' Manatik were very similar to their average.

Al-Sweida

No irrigation is reported for Al-Sweida Mohafaza. Nonirrigated agricultural production is limited primarily to winter crops and a crop-fallow rotation is generally practiced (combined winter/summer ratio with fallow of .451). The amount or percent of dryland planted varies, a probable consequence of variable climatic conditions.

The three Manatik of Al-Sweida are similar to the Mohafaza, with fairly uniform ratios and have dryland wheat, barley and chickpeas as major crops. The only anomaly occurred for Salkhad Mantika in 1977: the ratios for nonirrigated crops were affected by large changes in the amounts of land classified as nonirrigated and fallow. This is an apparent procedural, reporting problem which cannot be resolved with information currently available.

Quneitra

Only Quneitra Mantika in Quneitra Mohafaza had reported statistics. Quneitra's irrigated cropland is subject to some flooding and drainage problems in winter. Some limited double cropping does occur -- barley, flowering sern and dry broad beans are reported to be followed by summer vegetables. The average combined winter/summer irrigated ratio (1.155) confirms the multiple cropping. Intercropping is not practiced in this Mohafaza.

Nonirrigated cultivated land, according to the ratios, is fully utilized in crop production, mainly wheat, chickpeas and barley. An approximate 20 percent fallowing was reportedly practiced although no fallow land was shown in the land use data for 1976 or 1977.

Homs

A combined winter/summer average ratio of 1.149 for irrigated land was computed for Homs Mohafaza. This relatively high use-intensity ratio resulted from some interplanting of summer vegetables (especially with tomatoes), from very short season vegetables (squash, haricot beans, cucumber) following on land planted to winter legumes, and from short season vegetables multiple cropped during the summer season.

Dryland farming ratios with fallow decreased from 1975 through 1977 indicating the increase in fallowing and decrease in nonirrigated cultivated land. The combined average ratio was .622, but Mantika use-intensity ratios must be examined to discern rotation practices due to the variability in rainfall levels throughout the Mohafaza. For example, the non-irrigated use-intensity ratio with fallow ranged from .494 in Homs Mantika to .999 in Talkalakh Mantika.

Hama

Conditions in Hama Mohafaza are highly variable. Although influenced by a procedural problem related to the reporting of Mexican wheat for Mahrda in 1976, the average combined irrigated ratio for the Mohafaza of 1.044 illustrated the practice of some multiple cropping. The practice of multiple cropping on irrigated land can be further isolated to Mahrda and Al-Salamiya Manatik. Misiaf Mantika, with a ratio of .539, suggested an acute irrigation water shortage.

Dryland farming in Hama was characterized by deficient rainfall for full planting on nonirrigated crop land -- the ratios for all Manatik bear this out. Fallowing is practiced to differing degrees in each Mantika resulting in differing rotations, all presumably dependent on rainfall levels. Major dryland crops were wheat, barley, watermelons, lentils and vetches.

Al-Ghab

Al-Ghab Mohafaza is difficult to interpret in any straightforward manner. The basic problem is in the reporting of information. Land may be defined differently in each season. For example, if irrigation water is unnecessary on normally irrigated land due to good winter rainfall, the crops grown on land usually irrigated appears to be reported as nonirrigated crops. In summer, water is reputed to be available for only 60-70 percent of irrigated cropland.

Conclusions based only on the use-intensity ratio averages suggest slightly better than 100 percent utilization of irrigated land and suficient rainfall to plant all nonirrigated land. Most nonirrigated land would be cropped annually with some crop-fallow rotation practiced.

Tartous

Average, irrigated land use-intensity ratios of 1.012 for summer and .173 for winter were computed for Tartous Mohafaza. It was reported that temperature and flooding problems keep the winter ratio low while inter-cropping and interseasonal multiple cropping keeps the summer ratio high.

Average, nonirrigated land use-intensity ratios of .201 for summer and .850 for winter were computed. The combined ratio, 1.051, resulted from intraseasonal multiple summer dryland cropping and interseasonal multiple cropping.

Although the irrigated land base was very small in Al-Shekh Badr Mantika, the average ratio of .391 suggests a severe irrigation water shortage. The ratios for the remaining Manatik in Tartous range from 1.106 in Tartous Mantika to 1.627 in Draikish Mantika. Nonirrigated land was generally not fully planted, dryland seasonal use-intensity ratios ranged from .813 in Tartous Mantika to 1.011 in Banias Mantika. Only Safita's dryland ratios are much too high to be accounted for by multiple cropping of summer crops. The problem may have resulted from an over reporting of land in dryland perennials which is intercropped with winter and summer crops. No fallowing is practiced in Tartous Mohafaza.

Lattakia

Lattakia Mohafaza, like Tartous and Al-Ghab, has procedural reporting problems. Irrigated and nonirrigated land uses are mixed depending upon climatic conditions and irrigation water availability. For example, winter crops may be reported as nonirrigated although grown on land classified as irrigated. However, it was reported that some irrigation wells were abandoned due to salinity. Additionally, it was reported that a retention dam built for surface water was complete but no delivery system constructed. Jableh reported an irrigated ratio of 1.243, while average irrigated ratios of .313, .462 and .699 were computed for Al-Hiffeh, Lattakia and Al-Qardaha Manatik, respectively.

Dryland farming in Lattakia Mohafaza concentrated on winter crops. Nonirrigated land was not fully planted and, as illustrated by the .812 nonirrigated average combined ratio, was mainly in annual production with limited fallowing practiced. Mantika ratios ranged from .613 for Lattakia Mantika to .999 for Al-Hiffeh.

Idleb

It was reported that most of Idleb Mohafaza irrigation water is pumped from wells and some flooding problems occur during the wet seasons. Limited multiple cropping and summer crop interplanting are reported for irrigated land. The average, combined ratio of 1.100 suggests about a 100 percent use intensity. Ma'arrat-Al-Nu'man, Harem and Idleb Manatik with ratios of

1.122, 1.326 and 1.284, respectively, demonstrate higher intensification ratios. Ariha and Jisr-Al-Shughour, had ratios of .572 and .734, respectively, suggesting irrigation water problems.

Nonirrigated land ratios with fallow show Ariha and Ma'arrat-Al-Nu'man Manatik with about 20-25 percent fallow and Jisr-Al-Shughour with about 10 percent. In Harem and Idleb little fallow is practiced. Major dryland crops were wheat, barley, lentils and watermelon.

Aleppo

Some of the irrigated land in Aleppo Mohafaza was interseasonally double-cropped and interplanted with vegetables in summer, as indicated by the 1.111 average, combined irrigated ratio. All Mantika ratios clustered around the Mohafaza average, ranging from 1.064 in Jabal Sam'an to 1.174 in 'Ifrin. Major crops were Mexican wheat and cotton.

The nonirrigated average, combined ratio included fallow for Aleppo Mohafaza was .616. I'zaz and 'Ifrin Manatik dryland production occurred as almost all continuous annual cropping. Al-Bab, Minbej, Jarablus, Ein-al-Arab and Safira ranged from .514 to .571, which indicated a predominant crop-fallow rotation practice. Jabal Sam'an's ratio of .649 indicated a mix of continuous annual cropping and crop-fallow rotations. Major crops were wheat, barley, lentils, watermelon and sesame.

Al-Hasakeh

Single use of irrigated land reportedly characterizes Al-Hasakeh Mohafaza. However, ratios for Al-Hasakeh, Al-Kamishli and Al-Malkia Manatik (1.111, 1.191 and 1.167, respectively) suggest the practice of some multiple cropping. No irrigation water shortage was apparent except in the Ras Al-Ain Mantika that exhibited a .689 ratio average. Major crops were Mexican wheat and cotton.

Rotation practices for dryland farming in Al-Hasakeh depend on the rainfall zone of an area. A general crop-fallow rotation was practiced in Al-Malkia and Ras Al-Ain Manatik (.562 and .570 ratios). Al-Kamishli (.628) and Al-Hasakeh (.850) Manatik mix greater areas of continuous annual production with crop-fallow rotations. Major crops were wheat (Mexican and local) and barley.

Al-Rakka

Irrigated land in Al-Rakka Mohafaza was generally single use without irrigation water supply problems. The use-intensity ratio for Tell Abiad Mantika (1.275) indicates intereseasonal multiple cropping. Major irrigated crops, split approximately 55 percent summer and 45 percent winter crops, were cotton, Mexican wheat, local wheat, sesame and sugar beets.

Nonirrigated land was almost entirely planted to winter barley and wheat. The ratios with fallow were .602 for Al-Rakka Mantika and .589 for Tell Abiad Mantika, suggesting the predominance of a crop-fallow rotation.

Deir-ez-Zor

Irrigated land in Deir-ez-Zor Mohafaza is multiple cropped. Irrigated Mexican wheat in winter is followed by sesame, corn, okra, eggplant, potatoes and other short season vegetables in summer. The irrigated average, combined ratio (1.205) shows this intensification. Other irrigated crops grown are barley, local wheat, and cotton.

Nonirrigated use-intensity ratios are misleading. Barley and wheat are grown on land which is not considered or classified as cultivated. As a consequence of this and the fact that the actual fallow period may be longer than the two-year period for fallow specified in the definition, no fallow land was reported. Rotations are discernible by comparing sites with climatic information or with the stabilization zones delineated by Syrian Arab Republic agricultural planners. Major crops are local wheat and barley grown almost entirely in Deir-el-Zor Mantika.

Appendix 1

Methodology

A. Introduction

For the analysis of the agricultural land resource base and its patterns of land use, an Agricultural Resource Information System (ARIS) was designed for Syria. This system (ARIS) is composed of two subsystems -- the Land Information Subsystem (LIS), which spatially identifies the extent and certain uses of agricultural resources; and the Agro-Economic Information Subsystem (AEIS), which incorporates information on areas, production and yields of major crops and on intensity of land use by administrative units.

Detailed procedures for the development of the first of these subsystems (LIS) is presented in Appendix 2 of Chapter I in the Natural Resources Annex.

This present Appendix describes the data sources of the second subsystem (AEIS) and provides an explanation of how the data were prepared for computer manipulation, verified, analyzed and reported. This methodology is referred to in both Chapter I and Chapter II of the Agricultural Production Annex.

The analyses completed through the use of AEIS were: (1) calculation of crop use intensity ratios, (2) estimation of trends in crop production and area planted, (3) estimation of trends in livestock numbers, and (4) the estimation of area response predictive equations for major crops using multiple regression techniques. These analyses were completed as a partial basis for better understanding the basic factors affecting Syrian agricultural production and agricultural production potential.

The automation of agroeconomic data enables planners not only to have large quantities of information retrieved quickly, but allows the planner to manipulate and report the data for subsequent analyses of particular concerns relevant to agricultural resource planning.

Data are processed through two phases before data are reported or analyzed (Figure 1). The first phase is the data input phase where the data are prepared and entered into the computer. The second phase forces the data into three data checking routines. These are: code check, consistency check, and relational check.

The various computer programs which check the data enable the user to either correct keypunched cards or interactively correct the computer data files with the use of a terminal. After verification reports, intensity ratios, trend regressions, and area response predictive equations can be calculated or estimated.

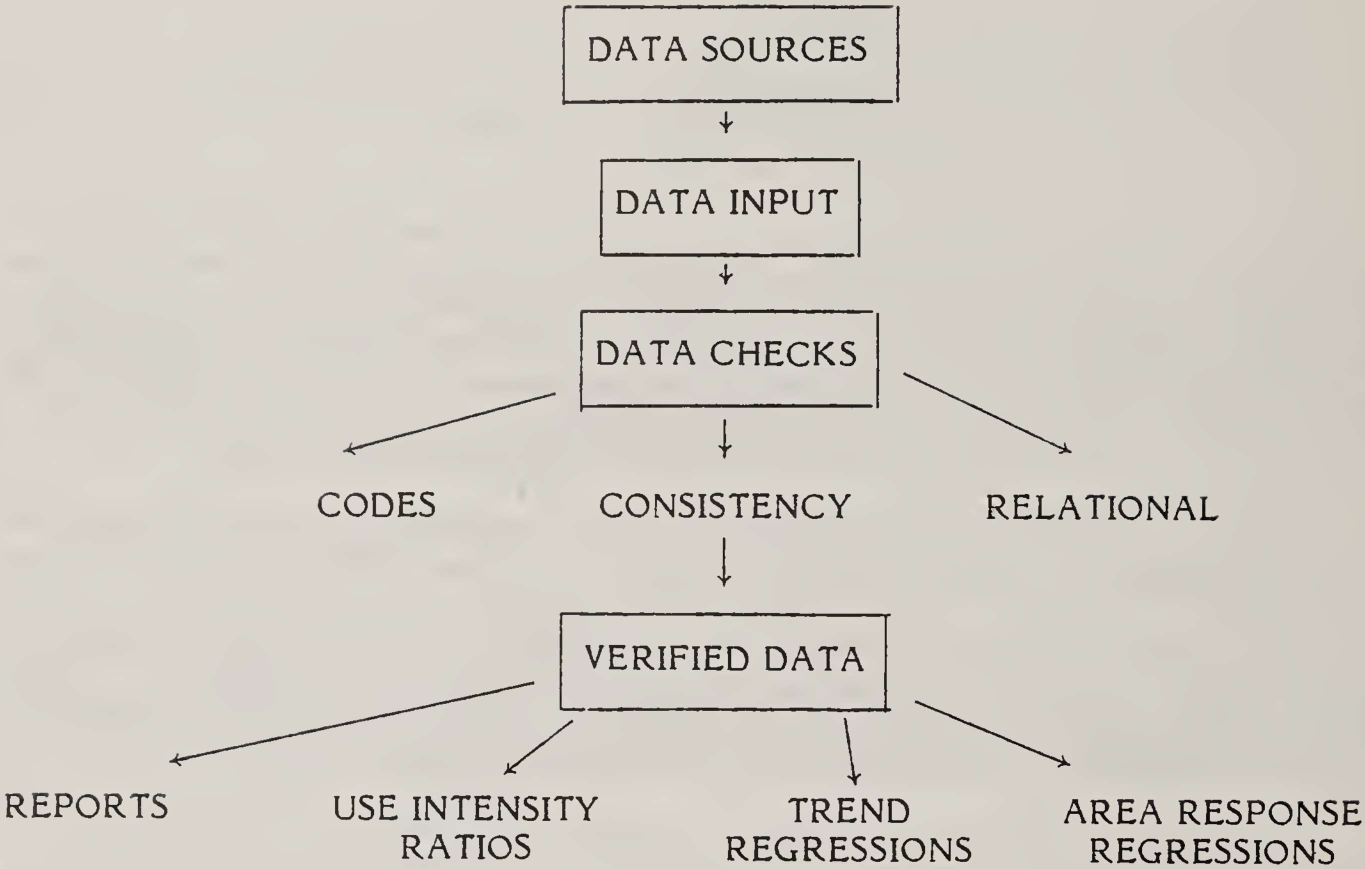

Figure 1. Data flow in Agroeconomic Information Subsystem (AEIS)

B. <u>Data Inputs and Checks</u>

<u>Published Sources</u>

1. <u>Winter Crops, 1968-1978</u> (inclusive). Ministry of Agriculture and Agrarian Reform, Department of Planning and Statistics, Division of Agricultural Statistics.

2. <u>Summer Crops, 1968-1977</u> (inclusive). Ministry of Agriculture and Agrarian Reform, Department of Planning and Statistics, Division of Agricultural Statistics.

3. <u>Fruit Crops, 1968-1977</u> (inclusive). Ministry of Agriculture and Agrarian Reform, Department of Planning and Statistics, Division of Statistics.

4. <u>Annual Agricultural Statistics Abstracts, 1975-1977</u>. Ministry of Agriculture and Agrarian Reform, Department of Planning and Statistics, Division of Agricultural Statistics.

5. <u>Statistical Abstract, 1967-1978</u> (inclusive). Office of the Prime Minister, Central Bureau of Statistics.

Other Information Sources

1. Ministry of Agriculture and Agrarian Reform, Department of Planning and Statistics, Division of Economics.

2. Ministry of Defense, Meteorological Department, Climatological Division.

The source data were put onto computer coding sheets and either key-punched or entered into the computer via a terminal. Data input via key-punched cards followed the usual sequence from coding sheets, to card, to the reading of these cards onto computer files. Terminal inputting of data used a series of computer programs to input the data and immediately check the data. The person inputting data by terminal specifies the number of lines to be inputted and the types of error checks to be run. As the data are inputted by terminal the checks are run, the errors displayed, and the data errors are corrected and the checks are rerun. The resulting corrected computer file is either used to create a master file, add onto an existing master file, or used to update an existing master file.

Code Checks

Every record of data in AEIS has a series of codes for data identification. Identification codes have been assigned for such units as mohafazat, manatik, years, crops and fruits, see file codes below. These codes appear in a horizontal and vertical order and the code checking routine checks for both types of order.

Consistency Checks

Three checks are designed to sum down the columns of a data record such as one containing areas of a crop reported by mantika, mohafaza, and nation so that the sums can be compared to published totals. When horizontal row sums are relevant, they can also be checked for consistency.

Relational Checks

Relational checks fall within two categories. The first is a range check. The column entries for a particular data record can be checked for numerical values that may be out of bounds. This requires knowledge about what range of numerical values is expected. The second check can best be illustrated as follows: when area, production and yield are reported, the production value is divided by the area value and compared to the yield figure.

Data errors, as a planner knows, arise in various ways. The most common error is the transcribing error. A second error is incorrect recorded information. Although correcting published totals was not within the scope of the

CRIES project activities, relational checks that identified inconsistencies will be brought to the attention of Syrian planners and corrected per their direction.

The checking routines allow for discrepancies of ± 1 hectare on row totals (production - area = yield) at the mantika level and ± 5 hectares on column sums (crop production or area planted) at the mohafaza level for crop, while there is allowed variation of ± 10 hectares on column sums for fruit at the mohafaza level. Land use data were checked using identities, rather than ranges or bounds. A separate computer routine rounds all data to whole hectares since some published areas and figures are reported to tenths of hectares and the data were stored accordingly.

Two new computer tapes were created when updates and/or additions to the data were made. One of the two old data tapes i always kept and the other reused so that at all times there are three computer tapes of data in addition to the currently active computer disk files.

C. Reports and Analysis - Data Retrieval

AEIS contains six types of computer programs which retrieve the data. They are: (1) general land use and cultivated land use reports, (2) crop summary, (3) fruit summary, (4) use-intensity ratios, (5) trend regression, and (6) area response regression. Reports (1), (2) and (3) are reformatted listings of the respective data with no analysis.

Report (4) outputs 1975, 1976, and 1977 information by irrigated and nonirrigated categories at the mantika and mohafaza levels for individual winter, summer and perennial (fruit) crops and then compares these totals with published general land use totals for irrigated and nonirrigated cultivated land, and fallow land. Averages of the crop information for these three years are calculated and can be compared with the ten-year area trend regression (Report (5). The crop areas at the mantika-level are summed to the mohafaza and similar ratios and averages run. Likewise, the mohafaza crop information is totaled for the nation and ratios and averages are calculated.

The ratios of areas calculated for nonirrigated crops are: (1) nonirrigated winter crops to nonirrigated cultivated land minus nonirrigated fruit, (2) nonirrigated summer crops to nonirrigated cultivated land minus nonirrigated fruit. The ratios of areas for irrigated crops are: (1) irrigated winter crops to irrigated cultivated land minus irrigated fruit, and (2) irrigated summer crops to irrigated cultivated land minus irrigated fruit. The last set of ratios of areas are: (1) nonirrigated winter crops to nonirrigated cultivated land plus fallow minus nonirrigated fruit, and (2) nonirrigated summer crops to nonirrigated cultivated land plus fallow minus nonirrigated fruit.

The trend computer program, Report (5), was run on each winter, summer and perennial crop by mantika so that area of a crop (y_1) and total production (y_2) of the crops are expressed as functions of time. In these expressions, $y_i = a + b (t) + \text{error}$, where "$y_i$" is the dependent variable (y_1 for area and y_2 for production), "t" is time, "b" is the slope of the line, and "a" is the y-intercept. A time series of ten years ('68-'77) was used in this case.

In report (6) area planted predictive equations for selected crops were fitted using multiple linear regression. Details of the area response predictive equations, including variables considered and functional forms, are reported separately in the report entitled, "Area Response Predictive Equations Report."

The verified data can be analyzed in various ways other than those described in Reports (4), (5), and (6). For example, other statistics could be obtained that would also be of use in simulation and optimization models.

D. File Codes

1. Mohafaza Codes

Damascus City	01	Lattakia	10
Damascus	02	Idleb	11
Dar'a	03	Alleppo	12
Sweida	04	Hasakeh	13
Qunitra	05	Raqa	14
Homs	06	Dier el Zor	15
Hama	07		
Ghab	08	Syrian Arab Republic	16
Tartous	09		

2. Montika Codes (by Mohafaza)

Mohafaza	Montika	Codes
Damascus City	Damascus City	011
Damascus	Damascus	021
	Duma	022
	El Tal	023
	Qatana	024
	Zabadani	025
	Nabek	026
	Qatifa	027
	Doria	028
	Yabarod	029
Dar'a	Dar'a	031
	Izra	032
Sweida	Sweida	041
	Shahba	042
	Salkhad	043
Qunitra	Qunitra	051
	Zoia	052
Homs	Homs	061
	Talkalakh	062
	Mokhram	063
	Rastan	064
	Tadmar	065
	Qasir	066
Hama	Hama	071
	Salamiya	072
	Masiaf	073
	Mahrda	074

Mohafaza	Montika	Code
Ghab	Ghab	081
Tartous	Tartous	091
	Banias	092
	Safita	093
	Darikish	094
	Shekh Badr	095
Lattakia	Lattakia	101
	Hafa	102
	Jableh	103
	Qardaha	104
Idleb	Idleb	111
	Harem	112
	Jisr	113
	Ma'ra	114
	Ariha	115
Alleppo	A'zaz	121
	A'farin	122
	Bab	123
	Manbaj	124
	Jarablos	125
	A'in el A'rb	126
	Jabl Sam'an	127
	Safira	128
Hasakeh	Hasakeh	131
	Qamishli	132
	Mal Kai	134
	Ras el A'in	135

Mohafaza	Montika	Code
Raqa	Raqa	141
	Tel Abiad	142
Dier el Zor	Dier el Zor	151
	Maiadin	152
	Bokamal	153

3. Winter Crops

Total Wheat	01
Wheat	02
Barley	03
Lentils	04
Chickpeas	05
Dry Broad Beans	06
Rambling Vetch	07
Bitter Vetch	08
Flowering Sern	09
Broad Beans	10
Cabbage	11
Cauliflower	12
Mexican Wheat	13

4. Summer Crops

Cotton	41
Tobacco	42
Sugar Beets	43
Tomatoes	44
Potatoes	45
Watermelon	46
Maize	47
Millet	48
Muskmelon	49
Dry Onions	50
Okra	51
Eggplant	52
Pumpkins	53
Haricot Beans	54
Dry Haricot Beans	55
Cucumbers	56
Squash	57
Sesame	58
Sunflowers	59
Peanuts	60

5. Fruit Trees (Perennials)

Grapes	71
Olives	72
Apricots	73
Apples	74
Plums	75
Green Plums	76
Pomegranates	77
Peaches	78
Figs	79

Appendix 2

Crop Area and Land-Use Intensity

The following tabulations show the area of land, in hectares, used for the production of winter, summer and perennial crops on both irrigated and nonirrigated land; and land-use intensity ratios by production system (irrigated or nonirrigated); and by season of crop planting (summer, winter, and perennial). (See sections C and D in the text).

The areas and ratios are given for 1975, 1976, and 1977, as well as for the 1975-77 average. Following the National totals, the Mohafazat are listed as follows:

Damascus City
Damascus
Dar'a
Al-Sweida
Quneitra
Homs
Hama
Al-Ghab
Tartous
Lattakia
Idleb
Aleppo
Al-Hasakeh
Al-Rakka
Deir-ez-Zor

NATIONAL TOTALS: SYRIAN ARAB REPUBLIC

	IRRIGATED				NONIRRIGATED			
	1975	1976	1977	AVERAGE	1975	1976	1977	AVERAGE
WINTER CROPS								
************								
LOCAL WHEAT	54981.	33662.	35645.	41429.	1367578.	1215825.	1129244.	1237549.
BARLEY	13888.	13374.	14511.	13924.	997506.	1158548.	1006981.	1054345.
LENTILS	2641.	6061.	6471.	5058.	95203.	140418.	171875.	135832.
CHICKPEAS	581.	518.	145.	415.	54608.	67035.	41001.	54215.
DRY BROAD BEANS	3966.	4833.	4688.	4496.	1859.	3372.	3302.	2844.
RAMBLING VETCH	331.	535.	293.	386.	30496.	39208.	38210.	35971.
BITTER VETCH	222.	347.	85.	218.	20909.	24815.	27316.	24347.
FLOWERING SEED	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	16373.	14827.	[illegible]
BROAD BEANS	3111.	3878.	4513.	3834.	2756.	2085.	2900.	[illegible]
CABBAGE	2087.	3006.	3294.	2796.	9.	0	6.	5.
CAULIFLOWER	2523.	3038.	3118.	2893.	12.	0	1.	4.
MEXICAN WHEAT	119383.	158626.	142789.	140266.	150325.	182146.	220039.	184170.
SUBTOTALS	204688.	229144.	217365.	217066.	2725447.	2849825.	2655702.	2743658.
SUMMER CROPS								
************								
COTTON	185089.	172660.	176283.	178011.	23037.	9100.	10223.	14120.
TOBACCO	183.	400.	504.	362.	17020.	17221.	14831.	16357.
SUGAR BEETS	6607.	6955.	10814.	8125.	1481.	1557.	1432.	1490.
TOMATOES	16577.	22170.	19449.	19399.	10172.	9448.	13342.	10987.
POTATOES	7838.	8460.	11729.	9342.	1614.	1426.	1101.	1380.
WATERMELON	2762.	6306.	4792.	4620.	69252.	73605.	82937.	75265.
MAIZE	13065.	20267.	23343.	18892.	2771.	3119.	2826.	2905.
MILLET	1832.	1469.	4346.	2549.	20885.	18082.	20530.	19832.
MUSKMELON	1587.	2268.	2089.	1981.	15954.	23800.	23828.	21194.
DRY ONIONS	5822.	5246.	7493.	6187.	2303.	1707.	1940.	1983.
OKRA	2310.	1801.	2118.	2076.	2285.	4259.	6071.	4205.
EGGPLANT	6578.	7122.	6177.	6626.	29.	12.	3.	15.
PUMPKINS	1696.	923.	312.	977.	3103.	3953.	4818.	3958.
HARICOT BEANS	4577.	4104.	3609.	4097.	189.	214.	229.	211.
DRY HARICOT BEANS	4362.	6074.	5999.	5478.	55.	68.	94.	72.
CUCUMBERS	9265.	9827.	8041.	9044.	4168.	7886.	10698.	7584.
SQUASH	5544.	6070.	5546.	5720.	1375.	1805.	1605.	1595.
SESAME	7754.	12418.	14931.	11701.	23430.	30223.	24387.	26013.
SUNFLOWER	554.	3261.	2898.	2238.	2539.	504.	2083.	1709.
PEANUTS	12593.	13370.	10919.	12294.	0	0	0	0
SUBTOTALS	296595.	311171.	321392.	309719.	201662.	207989.	222978.	210876.

PERENNIALS								
**********								
GRAPES	5170.	5346.	5608.	5375.	76214.	89545.	88366.	84708.
OLIVES	4949.	5060.	4431.	4813.	178177.	214361.	223833.	205457.
APRICOTS	9323.	9614.	9942.	9626.	1460.	1724.	1939.	1708.
APPLES	8534.	9019.	9246.	8933.	7908.	9073.	9819.	8933.
PLUMS	1765.	1892.	2085.	1914.	888.	952.	1135.	992.
GREEN PLUMS	1840.	2019.	2201.	2020.	307.	476.	650.	478.
POMEGRANATES	2645.	3398.	3705.	3249.	1073.	1039.	1219.	1110.
PEACHES	2494.	2663.	2786.	2648.	251.	340.	479.	357.
FIGS	761.	787.	780.	776.	19607.	21433.	20008.	20349.
SUBTOTALS	37481.	39798.	40784.	39354.	285885.	338943.	347448.	324092.
TOTAL CROP AREA	538764.	580113.	579541.	566139.	3212994.	3396757.	3226128.	3278626.

CULTIVATED LAND	1975	1976	1977	AVERAGE
NONIRRIGATED	3183373.	3501632.	3335968.	3340324.
IRRIGATED	516167.	546712.	530757.	531212.
FALLOW	1775885.	1496359.	1641828.	1638024.
TOTALS	5475425.	5544703.	5508553.	5509560.

LAND-USE INTENSITY RATIOS

	1975	1976	1977	AVERAGE
I. SEASONAL BY NONIRRIGATED/IRRIGATED				
A. NONIRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.070	.066	.075	.070
WINTER/(CULTIVATED-FRUIT)	.941	.901	.889	.910
B. IRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.620	.614	.656	.630
WINTER/(CULTIVATED-FRUIT)	.428	.452	.444	.441
II. NONIRRIGATED SEASONAL WITH FALLOW				
SUMMER/(CULTIVATED+FALLOW-FRUIT)	.043	.045	.048	.045
WINTER/(CULTIVATED+FALLOW-FRUIT)	.583	.612	.574	.589

MOHAFEZA DAMASCUS CITY

	IRRIGATED				NONIRRIGATED			
	1975	1976	1977	AVERAGE	1975	1976	1977	AVERAGE
WINTER CROPS								
************								
LOCAL WHEAT	0	124.	65.	95.	0	0	0	0
BARLEY	0	41.	30.	36.	0	0	0	0
LENTILS	0	0	0	0	0	0	0	0
CHICKPEAS	0	0	0	0	0	0	0	0
DRY BROAD BEANS	0	53.	64.	59.	0	0	0	0
RAMBLING VETCH	0	0	0	0	0	0	0	0
BITTER VETCH	0	0	0	0	0	0	0	0
FLOWERING SERN	0	22.	25.	24.	0	0	0	0
BROAD BEANS	0	98.	160.	129.	0	0	0	0
CABBAGE	0	98.	105.	102.	0	0	0	0
CAULIFLOWER	0	168.	72.	120.	0	0	0	0
MEXICAN WHEAT	0	26.	0	13.	0	0	0	0
SUBTOTALS	0	630.	521.	576.	0	0	0	0
SUMMER CROPS								
************								
COTTON	0	0	0	0	0	0	0	0
TOBACCO	0	0	0	0	0	0	0	0
SUGAR BEETS	0	0	0	0	0	0	0	0
TOMATOES	0	217.	217.	217.	0	0	0	0
POTATOES	0	6.	6.	6.	0	0	0	0
WATERMELON	0	0	0	0	0	0	0	0
MAIZE	0	27.	27.	27.	0	0	0	0
MILLET	0	12.	12.	12.	0	0	0	0
MUSKMELON	0	0	0	0	0	0	0	0
DRY ONIONS	0	85.	85.	85.	0	0	0	0
OKRA	0	39.	39.	39.	0	0	0	0
EGGPLANT	0	115.	115.	115.	0	0	0	0
PUMPKINS	0	11.	6.	9.	0	0	0	0
HARICOT BEANS	0	39.	45.	42.	0	0	0	0
DRY HARICOT BEANS	0	0	0	0	0	0	0	0
CUCUMBERS	0	11.	12.	12.	0	0	0	0
SQUASH	0	39.	39.	39.	0	0	0	0
SESAME	0	0	0	0	0	0	0	0
SUNFLOWER	0	0	0	0	0	0	0	0
PEANUTS	0	0	0	0	0	0	0	0
SUBTOTALS	0	601.	603.	602.	0	0	0	0

PERENNIALS								
**********								
GRAPES	0	4.	4.	4.	0	0	0	0
OLIVES	0	596.	596.	596.	0	0	0	0
APRICOTS	0	97.	98.	98.	0	0	0	0
APPLES	0	34.	34.	34.	0	0	0	0
PLUMS	0	12.	14.	13.	0	0	0	0
GREEN PLUMS	0	32.	32.	32.	0	0	0	0
POMEGRANATES	0	37.	37.	37.	0	0	0	0
PEACHES	0	28.	28.	28.	0	0	0	0
FIGS	0	9.	9.	9.	0	0	0	0
SUBTOTALS	0	849.	852.	851.	0	0	0	0
TOTAL CROP AREA	0	2080.	1976.	2028.	0	0	0	0

CULTIVATED LAND	1975	1976	1977	AVERAGE
NONIRRIGATED		0	0	0
IRRIGATED		1598.	2022.	1810.
FALLOW		0	0	0
TOTALS		1598.	2022.	1810.
LAND-USE INTENSITY RATIOS				
I. SEASONAL BY NONIRRIGATED/IRRIGATED				
A. NONIRRIGATED				
SUMMER/(CULTIVATED-FRUIT)		0	0	0
WINTER/(CULTIVATED-FRUIT)		0	0	0
B. IRRIGATED				
SUMMER/(CULTIVATED-FRUIT)		.802	.515	.659
WINTER/(CULTIVATED-FRUIT)		.841	.445	.643
II. NONIRRIGATED SEASONAL WITH FALLOW				
SUMMER/(CULTIVATED+FALLOW-FRUIT)		0	0	0
WINTER/(CULTIVATED+FALLOW-FRUIT)		0	0	0

MOHAFAZA: DAMASCUS

WINTER CROPS	IRRIGATED 1975	IRRIGATED 1976	IRRIGATED 1977	IRRIGATED AVERAGE	NONIRRIGATED 1975	NONIRRIGATED 1976	NONIRRIGATED 1977	NONIRRIGATED AVERAGE
LOCAL WHEAT	13173.	9181.	11325.	11226.	13478.	15677.	16979.	15378.
BARLEY	5475.	2619.	3560.	3885.	18036.	20961.	16431.	18476.
LENTILS	379.	439.	314.	377.	745.	1579.	1438.	1254.
CHICKPEAS	71.	123.	25.	73.	3504.	3421.	3543.	3489.
DRY BROAD BEANS	1611.	1766.	1790.	1722.	0	0	0	0
RAMBLING VETCH	6.	42.	0	16.	41.	165.	260.	155.
BITTER VETCH	103.	63.	20.	62.	2828.	3539.	2712.	3026.
FLOWERING SERN	784.	1010.	1331.	1042.	0	31.	243.	91.
BROAD BEANS	939.	1061.	1571.	1190.	0	0	0	0
CABBAGE	542.	1062.	1416.	1007.	0	0	0	0
CAULIFLOWER	731.	1341.	1713.	1262.	0	0	0	0
MEXICAN WHEAT	2601.	3382.	4120.	3368.	0	0	2.	1.
SUBTOTALS	26415.	22089.	27185.	25230.	38632.	45373.	41608.	41871.

SUMMER CROPS	IRRIGATED 1975	IRRIGATED 1976	IRRIGATED 1977	IRRIGATED AVERAGE	NONIRRIGATED 1975	NONIRRIGATED 1976	NONIRRIGATED 1977	NONIRRIGATED AVERAGE
COTTON	3044.	3263.	2713.	3007.	0	0	0	0
TOBACCO	3.	7.	0	3.	3.	3.	0	2.
SUGAR BEETS	1040.	1401.	1437.	1293.	0	0	0	0
TOMATOES	2506.	3015.	2709.	2743.	0	0	13.	4.
POTATOES	2537.	2109.	2876.	2507.	0	0	2.	1.
WATERMELON	36.	74.	75.	62.	0	21.	30.	17.
MAIZE	904.	1368.	1393.	1222.	0	0	1.	0.
MILLET	251.	151.	6.	136.	0	1.	35.	12.
MUSKMELON	40.	73.	59.	57.	0	10.	20.	10.
DRY ONIONS	322.	585.	451.	453.	0	0	1.	0.
OKRA	371.	310.	351.	344.	0	10.	11.	7.
EGGPLANT	1422.	1183.	1316.	1307.	0	0	0	0
PUMPKINS	267.	58.	82.	136.	0	0	0	0
HARICOT BEANS	586.	560.	567.	571.	0	0	0	0
DRY HARICOT BEANS	1283.	1251.	546.	1162.	0	0	0	0
CUCUMBERS	1066.	1234.	1451.	1250.	91.	73.	75.	80.
SQUASH	1022.	1090.	1175.	1096.	0	0	6.	2.
SESAME	0	0	0	0	0	0	0	0
SUNFLOWER	4.	3.	0	2.	0	0	0	0
PEANUTS	0	0	0	0	0	0	0	0
SUBTOTALS	16709.	17735.	17607.	17350.	94.	118.	194.	135.

PERENNIALS								
**********								
GRAPES	2796.	2713.	2739.	2749.	9306.	9205.	9205.	9239.
OLIVES	3256.	2653.	2703.	2871.	71.	212.	232.	172.
APRICOTS	5661.	5911.	6053.	5875.	27.	46.	131.	68.
APPLES	5673.	6056.	6213.	5981.	601.	817.	1021.	813.
PLUMS	724.	799.	847.	790.	2.	4.	5.	4.
GREEN PLUMS	801.	868.	919.	863.	1.	1.	2.	1.
POMEGRANATES	156.	191.	196.	181.	7.	6.	6.	6.
PEACHES	1645.	1741.	1743.	1710.	10.	13.	36.	20.
FIGS	143.	192.	185.	173.	3393.	3369.	3372.	3378.
SUBTOTALS	20855.	21124.	21598.	21192.	13418.	13673.	14010.	13700.
TOTAL CROP AREA	63979.	60948.	66390.	63772.	52144.	59164.	55812.	55707.

CULTIVATED LAND	1975	1976	1977	AVERAGE
NONIRRIGATED	54462.	56312.	55307.	55360.
IRRIGATED	70738.	69640.	68033.	69470.
FALLOW	34635.	32785.	41104.	36175.
TOTALS	159835.	158737.	164444.	161005.
LAND-USE INTENSITY RATIOS				
I. SEASONAL BY NONIRRIGATED/IRRIGATED				
A. NONIRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.002	.003	.005	.003
WINTER/(CULTIVATED-FRUIT)	.941	1.064	1.008	1.004
B. IRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.335	.366	.379	.360
WINTER/(CULTIVATED-FRUIT)	.530	.455	.585	.523
II. NONIRRIGATED SEASONAL WITH FALLOW				
SUMMER/(CULTIVATED+FALLOW-FRUIT)	.001	.002	.002	.002
WINTER/(CULTIVATED+FALLOW-FRUIT)	.510	.602	.505	.539

MOHAFAZA: DAR'A
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	IRRIGATED 1975	IRRIGATED 1976	IRRIGATED 1977	IRRIGATED AVERAGE	NONIRRIGATED 1975	NONIRRIGATED 1976	NONIRRIGATED 1977	NONIRRIGATED AVERAGE
WINTER CROPS								
************								
LOCAL WHEAT	1129.	1599.	2130.	1619.	40000.	85838.	72250.	66029.
BARLEY	1.	63.	20.	28.	5377.	23549.	12417.	13781.
LENTILS	50.	140.	90.	93.	2690.	19346.	14191.	12076.
CHICKPEAS	0	25.	0	8.	13928.	30576.	19425.	21310.
DRY BROAD BEANS	5.	9.	0	5.	5.	13.	0	6.
RAMBLING VETCH	0	0	0	0	1585.	5158.	6253.	4332.
BITTER VETCH	0	170.	0	57.	1694.	4762.	6173.	4210.
FLOWERING SERN	161.	38.	15.	71.	190.	738.	1345.	758.
BROAD BEANS	723.	700.	471.	631.	0	0	58.	19.
CABBAGE	133.	85.	65.	94.	0	0	0	0
CAULIFLOWER	605.	268.	228.	367.	0	0	0	0
MEXICAN WHEAT	0	0	0	0	0	0	0	0
SUBTOTALS	2807.	3097.	3019.	2974.	65469.	169980.	132112.	122520.
SUMMER CROPS								
************								
COTTON	0	0	0	0	0	0	0	0
TOBACCO	0	47.	52.	33.	0	1.	0	0.
SUGAR BEETS	0	0	0	0	0	0	0	0
TOMATOES	1483.	2055.	2116.	1885.	0	30.	55.	28.
POTATOES	175.	384.	439.	333.	0	0	0	0
WATERMELON	338.	3808.	42.	1396.	5.	2892.	2616.	1838.
MAIZE	440.	312.	1062.	605.	0	0	0	0
MILLET	0	0	0	0	64.	472.	531.	356.
MUSKMELON	20.	20.	0	13.	0	44.	617.	220.
DRY ONIONS	231.	617.	868.	572.	0	0	0	0
OKRA	284.	322.	313.	306.	80.	355.	772.	402.
EGGPLANT	181.	209.	168.	186.	0	0	0	0
PUMPKINS	0	0	0	0	0	0	0	0
HARICOT BEANS	147.	199.	196.	181.	0	0	7.	2.
DRY HARICOT BEANS	8.	120.	0	43.	0	0	0	0
CUCUMBERS	189.	261.	199.	216.	0	785.	209.	331.
SQUASH	191.	173.	489.	284.	0	9.	20.	10.
SESAME	0	0	151.	50.	0	6334.	3314.	3216.
SUNFLOWER	0	0	0	0	0	0	0	0
PEANUTS	0	10.	0	3.	0	0	0	0
SUBTOTALS	3687.	8537.	6095.	6106.	149.	10922.	8141.	6404.

PERENNIALS								
GRAPES	23.	23.	28.	25.	539.	543.	552.	545.
OLIVES	481.	553.	585.	540.	561.	1017.	1245.	941.
APRICOTS	26.	29.	34.	30.	5.	19.	19.	14.
APPLES	49.	48.	35.	44.	2.	2.	1.	2.
PLUMS	101.	106.	141.	116.	9.	9.	12.	10.
GREEN PLUMS	22.	32.	36.	30.	5.	5.	8.	6.
POMEGRANATES	36.	37.	48.	40.	38.	45.	49.	44.
PEACHES	184.	207.	258.	216.	22.	31.	31.	28.
FIGS	12.	12.	15.	13.	41.	41.	43.	42.
SUBTOTALS	934.	1047.	1180.	1054.	1222.	1712.	1960.	1631.
TOTAL CROP AREA	7428.	12681.	10294.	10134.	66840.	182614.	142213.	130556.

CULTIVATED LAND	1975	1976	1977	AVERAGE
NONIRRIGATED	66873.	173817.	141043.	127244.
IRRIGATED	8559.	14501.	11437.	11499.
FALLOW	177447.	80447.	116227.	124707.
TOTALS	252879.	268765.	268707.	263450.
LAND-USE INTENSITY RATIOS				
I. SEASONAL BY NONIRRIGATED/IRRIGATED				
A. NONIRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.002	.063	.059	.041
WINTER/(CULTIVATED-FRUIT)	.997	.988	.950	.978
B. IRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.484	.635	.594	.571
WINTER/(CULTIVATED-FRUIT)	.368	.230	.294	.298
II. NONIRRIGATED SEASONAL WITH FALLOW				
SUMMER/(CULTIVATED+FALLOW-FRUIT)	.001	.043	.032	.025
WINTER/(CULTIVATED+FALLOW-FRUIT)	.269	.673	.517	.487

MOHAFAZA: SWEIDA

	IRRIGATED 1975	IRRIGATED 1976	IRRIGATED 1977	IRRIGATED AVERAGE	NONIRRIGATED 1975	NONIRRIGATED 1976	NONIRRIGATED 1977	NONIRRIGATED AVERAGE
WINTER CROPS								
************								
LOCAL WHEAT	0	0	0	0	31093.	41019.	37627.	36580.
BARLEY	0	0	0	0	11983.	15426.	12765.	13391.
LENTILS	0	0	0	0	4756.	4437.	3766.	4320.
CHICKPEAS	0	0	0	0	9695.	15145.	5563.	10134.
DRY BROAD BEANS	0	0	0	0	0	35.	0	12.
RAMBLING VETCH	0	0	0	0	840.	2388.	1817.	1682.
BITTER VETCH	0	0	0	0	1954.	1373.	2008.	1778.
FLOWERING SERN	0	0	0	0	673.	1202.	1536.	1137.
BROAD BEANS	0	0	0	0	0	0	0	0
CABBAGE	0	0	0	0	0	0	0	0
CAULIFLOWER	0	0	0	0	0	0	0	0
MEXICAN WHEAT	0	0	0	0	0	0	0	0
SUBTOTALS	0	0	0	0	60994.	81025.	65082.	69034.
SUMMER CROPS								
************								
COTTON	0	0	0	0	0	0	0	0
TOBACCO	0	0	0	0	3.	0	0	1.
SUGAR BEETS	0	0	0	0	0	0	0	0
TOMATOES	0	0	0	0	655.	842.	3039.	1512.
POTATOES	0	0	0	0	0	0	0	0
WATERMELON	0	0	0	0	170.	2278.	6279.	2909.
MAIZE	0	0	0	0	0	0	0	0
MILLET	0	0	0	0	0	0	0	0
MUSKMELON	0	0	0	0	0	0	0	0
DRY ONIONS	0	0	0	0	0	0	0	0
OKRA	0	0	0	0	0	0	0	0
EGGPLANT	0	0	0	0	0	0	0	0
PUMPKINS	0	0	0	0	0	0	0	0
HARICOT BEANS	0	0	0	0	0	0	0	0
DRY HARICOT BEANS	0	0	0	0	0	0	0	0
CUCUMBERS	0	0	0	0	95.	631.	2097.	941.
SQUASH	0	0	0	0	15.	0	0	5.
SESAME	0	0	0	0	0	0	0	0
SUNFLOWER	0	0	0	0	0	0	0	0
PEANUTS	0	0	0	0	0	0	0	0
SUBTOTALS	0	0	0	0	938.	3751.	11415.	5368.

PERENNIALS								
**********								
GRAPES	0	0	0	0	11900.	12879.	12939.	12573.
OLIVES	0	0	0	0	763.	894.	995.	884.
APRICOTS	0	0	0	0	25.	99.	112.	79.
APPLES	0	0	0	0	2257.	2332.	2775.	2455.
PLUMS	0	0	0	0	161.	237.	324.	241.
GREEN PLUMS	0	0	0	0	18.	42.	81.	47.
POMEGRANATES	0	0	0	0	27.	42.	48.	39.
PEACHES	0	0	0	0	62.	123.	207.	131.
FIGS	0	0	0	0	543.	655.	655.	618.
SUBTOTALS	0	0	0	0	15756.	17303.	18136.	17065.
TOTAL CROP AREA	0	0	0	0	77688.	102079.	94633.	91467.

	1975	1976	1977	AVERAGE
CULTIVATED LAND				
NONIRRIGATED	78124.	117850.	82731.	92902.
IRRIGATED	0	0	0	0
FALLOW	97914.	75155.	93308.	88794.
TOTALS	176038.	193005.	176039.	181695.

LAND-USE INTENSITY RATIOS

	1975	1976	1977	AVERAGE
I. SEASONAL BY NONIRRIGATED/IRRIGATED				
A. NONIRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.015	.037	.177	.076
WINTER/(CULTIVATED-FRUIT)	.978	.806	1.008	.930
B. IRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	0	0	0	0
WINTER/(CULTIVATED-FRUIT)	0	0	0	0
II. NONIRRIGATED SEASONAL WITH FALLOW				
SUMMER/(CULTIVATED+FALLOW-FRUIT)	.006	.021	.072	.033
WINTER/(CULTIVATED+FALLOW-FRUIT)	.381	.461	.412	.418

MOHAFAZA: QUNITRA
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	IRRIGATED				NONIRRIGATED			
	1975	1976	1977	AVERAGE	1975	1976	1977	AVERAGE
WINTER CROPS								
************								
LOCAL WHEAT	150.	595.	300.	348.	3400.	7237.	5350.	5329.
BARLEY	50.	125.	0	58.	1100.	1337.	535.	991.
LENTILS	0	0	0	0	100.	105.	50.	85.
CHICKPEAS	0	0	0	0	1600.	3935.	2675.	2737.
DRY BROAD BEANS	10.	94.	100.	68.	35.	70.	0	35.
RAMBLING VETCH	0	0	0	0	0	0	0	0
BITTER VETCH	0	0	0	0	0	0	160.	53.
FLOWERING SERN	0	0	200.	67.	0	1236.	1400.	879.
BROAD BEANS	0	0	0	0	0	0	0	0
CABBAGE	0	0	0	0	0	0	0	0
CAULIFLOWER	0	0	0	0	0	0	0	0
MEXICAN WHEAT	0	10.	100.	37.	0	30.	35.	22.
SUBTOTALS	210.	824.	700.	578.	6235.	13950.	10205.	10130.
SUMMER CROPS								
************								
COTTON	0	0	0	0	0	0	0	0
TOBACCO	0	0	0	0	12.	0	0	4.
SUGAR BEETS	0	0	0	0	0	0	0	0
TOMATOES	270.	80.	288.	213.	10.	40.	0	17.
POTATOES	0	0	0	0	0	0	0	0
WATERMELON	6.	0	0	2.	0	155.	50.	68.
MAIZE	100.	200.	315.	205.	0	80.	0	27.
MILLET	0	0	0	0	350.	1000.	426.	592.
MUSKMELON	0	0	0	0	0	0	0	0
DRY ONIONS	5.	0	0	2.	5.	5.	0	3.
OKRA	15.	8.	7.	10.	0	0	0	0
EGGPLANT	6.	2.	8.	5.	0	0	0	0
PUMPKINS	0	0	0	0	0	0	0	0
HARICOT BEANS	5.	0	0	2.	0	0	0	0
DRY HARICOT BEANS	0	2.	0	1.	0	0	0	0
CUCUMBERS	20.	8.	15.	14.	0	25.	50.	25.
SQUASH	3.	0	10.	4.	5.	15.	0	7.
SESAME	0	0	0	0	0	15.	0	5.
SUNFLOWER	0	0	0	0	0	0	0	0
PEANUTS	0	0	0	0	0	0	0	0
SUBTOTALS	430.	300.	643.	458.	382.	1335.	526.	748.

PERENNIALS
****

GRAPES	0	0	0	0	748.	748.	755.	750.
OLIVES	0	0	0	0	0	0	155.	52.
APRICOTS	0	0	0	0	0	0	19.	6.
APPLES	0	0	0	0	15.	15.	30.	20.
PLUMS	0	0	0	0	4.	4.	4.	4.
GREEN PLUMS	0	0	0	0	0	0	7.	2.
POMEGRANATES	0	0	0	0	0	0	0	0
PEACHES	0	0	0	0	3.	3.	9.	5.
FIGS	0	0	0	0	306.	290.	302.	299.
SUBTOTALS	0	0	0	0	1076.	1060.	1281.	1139.
TOTAL CROP AREA	640.	1124.	1343.	1036.	7693.	16345.	12012.	12017.

CULTIVATED LAND	1975	1976	1977	AVERAGE
NONIRRIGATED	6695.	12000.	12000.	10232.
IRRIGATED	640.	1000.	1000.	880.
FALLOW	5305.	0	0	1768.
TOTALS	12640.	13000.	13000.	12880.

LAND-USE INTENSITY RATIOS

	1975	1976	1977	AVERAGE
I. SEASONAL BY NONIRRIGATED/IRRIGATED				
A. NONIRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.068	.122	.049	.080
WINTER/(CULTIVATED-FRUIT)	1.110	1.275	.952	1.112
B. IRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.672	.300	.643	.538
WINTER/(CULTIVATED-FRUIT)	.328	.824	.700	.617
II. NONIRRIGATED SEASONAL WITH FALLOW				
SUMMER/(CULTIVATED+FALLOW-FRUIT)	.035	.122	.049	.069
WINTER/(CULTIVATED+FALLOW-FRUIT)	.571	1.275	.952	.933

MOHAFAZA: HOMS
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	IRRIGATED 1975	IRRIGATED 1976	IRRIGATED 1977	IRRIGATED AVERAGE	NONIRRIGATED 1975	NONIRRIGATED 1976	NONIRRIGATED 1977	NONIRRIGATED AVERAGE
WINTER CROPS								
************								
LOCAL WHEAT	5693.	5448.	2845.	4662.	113356.	69912.	72260.	91843.
BARLEY	1017.	1040.	669.	909.	78818.	63792.	55689.	66100.
LENTILS	250.	477.	267.	331.	7063.	7910.	6603.	7192.
CHICKPEAS	407.	343.	22.	257.	906.	1161.	553.	873.
DRY BROAD BEANS	550.	659.	906.	705.	62.	273.	243.	193.
RAMBLING VETCH	230.	250.	188.	223.	12682.	12874.	12783.	12780.
BITTER VETCH	84.	62.	28.	58.	10087.	10739.	11041.	10622.
FLOWERING SERN	4.	91.	159.	85.	1502.	2061.	2229.	1931.
BROAD BEANS	273.	480.	600.	451.	75.	36.	118.	76.
CABBAGE	573.	928.	927.	809.	9.	0	0	3.
CAULIFLOWER	640.	868.	697.	735.	12.	0	0	4.
MEXICAN WHEAT	1369.	2417.	2266.	2017.	196.	882.	1018.	699.
SUBTOTALS	11090.	13063.	9574.	11242.	224768.	189640.	162537.	192315.
SUMMER CROPS								
************								
COTTON	4805.	4541.	4514.	4620.	249.	254.	188.	230.
TOBACCO	0	0	0	0	41.	43.	37.	40.
SUGAR BEETS	3491.	3828.	3647.	3655.	0	0	0	0
TOMATOES	1799.	2746.	2317.	2284.	0	260.	235.	165.
POTATOES	2431.	2588.	4446.	3155.	395.	187.	206.	263.
WATERMELON	1.	4.	6.	4.	3144.	3809.	2089.	3014.
MAIZE	4313.	4669.	5146.	4709.	300.	482.	536.	439.
MILLET	0	49.	30.	26.	11877.	6976.	9530.	9461.
MUSKMELON	3.	0	0	1.	177.	244.	171.	197.
DRY ONIONS	2292.	1953.	2176.	2140.	0	0	2.	1.
OKRA	233.	129.	108.	157.	1.	46.	13.	20.
EGGPLANT	1030.	1380.	917.	1109.	0	1.	0	0.
PUMPKINS	88.	29.	20.	46.	90.	400.	359.	283.
HARICOT BEANS	1041.	849.	569.	820.	0	0	7.	2.
DRY HARICOT BEANS	2274.	3076.	2700.	2683.	0	0	0	0
CUCUMBERS	1152.	989.	689.	943.	1111.	468.	565.	715.
SQUASH	513.	568.	364.	482.	0	56.	75.	44.
SESAME	59.	32.	24.	35.	250.	20.	14.	95.
SUNFLOWER	82.	18.	16.	39.	0	0	0	0
PEANUTS	1600.	1494.	1240.	1445.	0	0	0	0
SUBTOTALS	27189.	28942.	28929.	28353.	17635.	13246.	14027.	14969.

PERENNIALS								
**********								
GRAPES	1314.	1606.	1512.	1477.	17339.	17691.	17691.	17574.
OLIVES	1119.	1140.	418.	892.	2899.	3001.	3105.	3002.
APRICOTS	764.	718.	704.	729.	0	0	0	0
APPLES	552.	613.	660.	608.	38.	38.	56.	44.
PLUMS	100.	134.	139.	124.	0	0	2.	1.
GREEN PLUMS	93.	98.	99.	97.	0	0	0	0
POMEGRANATES	182.	186.	197.	188.	0	0	1.	0.
PEACHES	74.	84.	90.	83.	4.	2.	2.	3.
FIGS	102.	103.	104.	103.	701.	700.	700.	700.
SUBTOTALS	4300.	4682.	3923.	4302.	20981.	21432.	21557.	21323.
TOTAL CROP AREA	42579.	46687.	42426.	43897.	263384.	224318.	198121.	228608.

CULTIVATED LAND	1975	1976	1977	AVERAGE
NONIRRIGATED	242132.	253551.	211798.	229160.
IRRIGATED	37252.	39177.	39975.	38801.
FALLOW	98228.	110724.	151693.	126882.
TOTALS	377612.	403452.	403466.	394843.
LAND-USE INTENSITY RATIOS				
I. SEASONAL BY NONIRRIGATED/IRRIGATED				
A. NONIRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.080	.062	.074	.072
WINTER/(CULTIVATED-FRUIT)	1.016	.894	.854	.922
B. IRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.825	.839	.802	.822
WINTER/(CULTIVATED-FRUIT)	.337	.379	.266	.327
II. NONIRRIGATED SEASONAL WITH FALLOW				
SUMMER/(CULTIVATED+FALLOW-FRUIT)	.055	.039	.041	.045
WINTER/(CULTIVATED+FALLOW-FRUIT)	.704	.553	.475	.577

MOHAFAZA: HAMA

	IRRIGATED				NONIRRIGATED			
	1975	1976	1977	AVERAGE	1975	1976	1977	AVERAGE
WINTER CROPS								
LOCAL WHEAT	6559.	4562.	3004.	4708.	116970.	72003.	78124.	89032.
BARLEY	1733.	1620.	1397.	1583.	95301.	86056.	83549.	88302.
LENTILS	492.	1455.	1316.	1088.	7909.	6720.	11262.	8630.
CHICKPEAS	43.	8.	22.	24.	1967.	1124.	1458.	1516.
DRY BROAD BEANS	301.	356.	336.	331.	572.	650.	1016.	746.
RAMBLING VETCH	35.	218.	105.	119.	5344.	5015.	5426.	5262.
BITTER VETCH	35.	35.	30.	33.	1574.	2365.	2678.	2206.
FLOWERING SERN	25.	100.	83.	69.	0	61.	22.	28.
BROAD BEANS	234.	240.	206.	227.	0	22.	22.	15.
CABBAGE	87.	85.	112.	95.	0	0	0	0
CAULIFLOWER	70.	65.	54.	63.	0	0	0	0
MEXICAN WHEAT	6972.	15123.	5161.	9085.	1960.	3894.	6609.	4154.
SUBTOTALS	16586.	23867.	11826.	17426.	231597.	177910.	190166.	199891.
SUMMER CROPS								
COTTON	7970.	6787.	8059.	7605.	3329.	851.	1468.	1883.
TOBACCO	0	0	0	0	165.	189.	133.	162.
SUGAR BEETS	465.	1264.	1240.	990.	0	0	0	0
TOMATOES	702.	620.	620.	647.	338.	393.	368.	366.
POTATOES	675.	481.	997.	718.	68.	33.	63.	55.
WATERMELON	119.	282.	178.	193.	12091.	8246.	8977.	9771.
MAIZE	786.	489.	544.	606.	306.	553.	517.	459.
MILLET	14.	35.	0	16.	2710.	2623.	2579.	2637.
MUSKMELON	31.	428.	486.	315.	1097.	923.	2284.	1435.
DRY ONIONS	1226.	619.	1182.	1009.	31.	21.	16.	23.
OKRA	50.	48.	43.	47.	522.	502.	622.	549.
EGGPLANT	416.	378.	392.	395.	1.	0	2.	1.
PUMPKINS	52.	22.	10.	28.	196.	268.	249.	238.
HARICOT BEANS	199.	171.	179.	183.	17.	0	0	6.
DRY HARICOT BEANS	534.	623.	573.	577.	0	24.	23.	16.
CUCUMBERS	174.	129.	132.	145.	1451.	1254.	1835.	1513.
SQUASH	97.	99.	104.	100.	7.	0	6.	4.
SESAME	27.	16.	39.	27.	243.	140.	155.	179.
SUNFLOWER	25.	7.	0	11.	722.	382.	299.	468.
PEANUTS	5.	0	0	2.	0	0	0	0
SUBTOTALS	13567.	12498.	14778.	13614.	23294.	16402.	19596.	19764.

PERENNIALS
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GRAPES	534.	434.	433.	467.	9331.	10219.	11203.	10251.
OLIVES	45.	77.	75.	66.	478.	786.	891.	718.
APRICOTS	353.	344.	330.	342.	12.	8.	7.	9.
APPLES	205.	205.	203.	204.	55.	53.	52.	53.
PLUMS	146.	155.	159.	153.	20.	19.	21.	20.
GREEN PLUMS	188.	210.	219.	206.	0	2.	2.	1.
POMEGRANATES	159.	161.	163.	161.	24.	41.	42.	36.
PEACHES	186.	203.	191.	193.	4.	7.	8.	6.
FIGS	312.	286.	280.	293.	1915.	1906.	1905.	1909.
SUBTOTALS	2128.	2075.	2053.	2085.	11839.	13041.	14131.	13004.
TOTAL CROP AREA	32281.	38440.	28657.	33126.	266730.	207353.	223893.	232659.

CULTIVATED LAND	1975	1976	1977	AVERAGE
NONIRRIGATED	244102.	269931.	255372.	256468.
IRRIGATED	30982.	32558.	31778.	31773.
FALLOW	126063.	122454.	128716.	125744.
TOTALS	401147.	424943.	415866.	413985.
LAND-USE INTENSITY RATIOS				
I. SEASONAL BY NONIRRIGATED/IRRIGATED				
A. NONIRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.100	.064	.081	.082
WINTER/(CULTIVATED-FRUIT)	.997	.693	.788	.826
B. IRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.470	.410	.497	.459
WINTER/(CULTIVATED-FRUIT)	.575	.783	.398	.585
II. NONIRRIGATED SEASONAL WITH FALLOW				
SUMMER/(CULTIVATED+FALLOW-FRUIT)	.065	.043	.053	.054
WINTER/(CULTIVATED+FALLOW-FRUIT)	.646	.469	.514	.543

MOHAFAZA: GHAB

	IRRIGATED 1975	IRRIGATED 1976	IRRIGATED 1977	IRRIGATED AVERAGE	NONIRRIGATED 1975	NONIRRIGATED 1976	NONIRRIGATED 1977	NONIRRIGATED AVERAGE
WINTER CROPS								
LOCAL WHEAT	0	0	0	0	5879.	1995.	2979.	3618.
BARLEY	0	0	0	0	1817.	1274.	1100.	1397.
LENTILS	0	0	0	0	875.	1641.	2026.	1514.
CHICKPEAS	0	0	0	0	800.	59.	28.	296.
DRY BROAD BEANS	0	0	0	0	349.	784.	1047.	727.
RAMBLING VETCH	0	0	0	0	689.	975.	930.	865.
BITTER VETCH	0	0	0	0	0	0	0	0
FLOWERING SERN	0	0	0	0	0	0	0	0
BROAD BEANS	0	0	0	0	0	0	0	0
CABBAGE	0	0	0	0	0	0	0	0
CAULIFLOWER	0	0	0	0	0	0	0	0
MEXICAN WHEAT	0	7912.	0	2637.	31000.	19744.	29355.	26700.
SUBTOTALS	0	7912.	0	2637.	41409.	26472.	37465.	35115.
SUMMER CROPS								
COTTON	18580.	17500.	20960.	19013.	5015.	467.	393.	1958.
TOBACCO	0	0	0	0	21.	16.	11.	16.
SUGAR BEETS	1107.	0	284.	464.	1481.	1557.	1432.	1490.
TOMATOES	667.	863.	542.	691.	0	0	0	0
POTATOES	341.	1443.	1717.	1167.	382.	591.	0	324.
WATERMELON	73.	0	1925.	666.	4278.	0	4525.	2934.
MAIZE	2202.	6680.	7016.	5299.	0	0	0	0
MILLET	53.	1030.	0	361.	1408.	816.	1458.	1227.
MUSKMELON	0	0	0	0	0	0	0	0
DRY ONIONS	365.	549.	1104.	673.	13.	0	0	4.
OKRA	49.	76.	42.	56.	0	0	0	0
EGGPLANT	272.	505.	325.	367.	0	0	0	0
PUMPKINS	0	0	0	0	0	0	0	0
HARICOT BEANS	71.	108.	101.	93.	0	0	0	0
DRY HARICOT BEANS	0	413.	666.	360.	0	0	0	0
CUCUMBERS	82.	1652.	115.	616.	0	0	0	0
SQUASH	28.	58.	17.	34.	0	0	0	0
SESAME	0	0	0	0	52.	34.	0	29.
SUNFLOWER	281.	2383.	2589.	1751.	1599.	30.	1013.	881.
PEANUTS	58.	0	4.	21.	0	0	0	0
SUBTOTALS	24229.	33260.	37407.	31632.	14249.	3511.	8832.	8864.

PERENNIALS								
**********								
GRAPES	9.	9.	11.	10.	672.	675.	815.	721.
OLIVES	2.	2.	2.	2.	116.	120.	120.	119.
APRICOTS	31.	30.	25.	29.	15.	15.	15.	15.
APPLES	34.	34.	30.	33.	8.	8.	7.	8.
PLUMS	14.	14.	10.	13.	10.	10.	9.	10.
GREEN PLUMS	10.	10.	7.	9.	0	1.	0	0.
POMEGRANATES	58.	58.	56.	57.	21.	14.	15.	17.
PEACHES	46.	44.	44.	45.	4.	4.	4.	4.
FIGS	61.	61.	59.	60.	195.	196.	195.	195.
SUBTOTALS	265.	262.	244.	257.	1041.	1043.	1180.	1088.
TOTAL CROP AREA	24494.	41434.	37651.	34526.	56699.	31026.	47477.	45067.

CULTIVATED LAND	1975	1976	1977	AVERAGE
NONIRRIGATED	59228.	41055.	55042.	51775.
IRRIGATED	25112.	41802.	27996.	31637.
FALLOW	0	1483.	1302.	928.
TOTALS	84340.	84340.	84340.	84340.
LAND-USE INTENSITY RATIOS				
I. SEASONAL BY NONIRRIGATED/IRRIGATED				
A. NONIRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.245	.088	.164	.166
WINTER/(CULTIVATED-FRUIT)	.712	.662	.696	.690
B. IRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.975	.801	1.348	1.041
WINTER/(CULTIVATED-FRUIT)	0	.190	0	.063
II. NONIRRIGATED SEASONAL WITH FALLOW				
SUMMER/(CULTIVATED+FALLOW-FRUIT)	.245	.085	.160	.163
WINTER/(CULTIVATED+FALLOW-FRUIT)	.712	.638	.679	.676

MOHAFAZA: TARTOUS

	IRRIGATED 1975	IRRIGATED 1976	IRRIGATED 1977	IRRIGATED AVERAGE	NONIRRIGATED 1975	NONIRRIGATED 1976	NONIRRIGATED 1977	NONIRRIGATED AVERAGE
WINTER CROPS								
LOCAL WHEAT	0	833.	1316.	716.	23594.	30097.	28355.	27349.
BARLEY	0	95.	123.	73.	3090.	3973.	4035.	3699.
LENTILS	0	4.	9.	4.	600.	677.	705.	661.
CHICKPEAS	0	8.	31.	13.	2245.	2294.	2321.	2287.
DRY BROAD BEANS	0	10.	0	3.	286.	388.	386.	353.
RAMBLING VETCH	0	0	0	0	184.	370.	368.	307.
BITTER VETCH	0	17.	7.	8.	940.	1225.	1236.	1136.
FLOWERING SERN	0	0	0	0	627.	989.	987.	868.
BROAD BEANS	95.	546.	341.	327.	1823.	1309.	1813.	1648.
CABBAGE	286.	433.	347.	355.	0	0	0	0
CAULIFLOWER	156.	144.	132.	144.	0	0	0	0
MEXICAN WHEAT	0	1699.	1498.	1066.	9687.	4044.	2919.	5550.
SUBTOTALS	537.	3789.	3804.	2710.	43084.	45366.	43125.	43858.
SUMMER CROPS								
COTTON	0	0	0	0	0	0	0	0
TOBACCO	3.	4.	8.	5.	2161.	2189.	2050.	2133.
SUGAR BEETS	0	0	0	0	0	0	0	0
TOMATOES	1503.	2043.	2060.	1869.	964.	1196.	1197.	1119.
POTATOES	478.	538.	271.	429.	488.	313.	528.	443.
WATERMELON	55.	75.	254.	128.	304.	437.	343.	361.
MAIZE	813.	1110.	795.	906.	2155.	1997.	1751.	1968.
MILLET	0	0	210.	70.	2463.	2985.	3050.	2833.
MUSKMELON	12.	0	22.	11.	344.	111.	159.	205.
DRY ONIONS	98.	50.	71.	73.	474.	575.	494.	514.
OKRA	99.	141.	142.	127.	226.	190.	196.	204.
EGGPLANT	488.	596.	601.	562.	0	0	0	0
PUMPKINS	13.	23.	11.	16.	5.	4.	5.	5.
HARICOT BEANS	447.	510.	617.	525.	83.	115.	116.	105.
DRY HARICOT BEANS	171.	83.	161.	138.	35.	35.	63.	44.
CUCUMBERS	3816.	2670.	2781.	3089.	156.	160.	144.	153.
SQUASH	680.	805.	885.	790.	113.	153.	147.	138.
SESAME	26.	20.	75.	40.	94.	135.	162.	130.
SUNFLOWER	0	30.	0	10.	1.	21.	1.	8.
PEANUTS	7667.	7755.	5510.	6977.	0	0	0	0
SUBTOTALS	16369.	16453.	14474.	15765.	10066.	10616.	10406.	10363.

PERENNIALS								
**********								
GRAPES	43.	45.	51.	46.	1562.	1627.	1659.	1616.
OLIVES	1.	1.	0	1.	57336.	57749.	58311.	57799.
APRICOTS	74.	78.	91.	81.	170.	184.	203.	186.
APPLES	465.	484.	517.	489.	769.	830.	887.	829.
PLUMS	173.	178.	189.	180.	67.	84.	101.	84.
GREEN PLUMS	15.	13.	13.	14.	11.	13.	18.	14.
POMEGRANATES	161.	190.	206.	192.	52.	59.	74.	62.
PEACHES	87.	99.	105.	97.	31.	43.	49.	41.
FIGS	10.	14.	15.	13.	843.	892.	919.	885.
SUBTOTALS	1049.	1102.	1187.	1113.	60841.	61481.	62221.	61514.
TOTAL CROP AREA	17955.	21344.	19465.	19588.	113991.	117463.	115752.	115735.

CULTIVATED LAND	1975	1976	1977	AVERAGE
NONIRRIGATED	113338.	113865.	112141.	113115.
IRRIGATED	16509.	16136.	17595.	16747.
FALLOW	0	0	0	0
TOTALS	129847.	130001.	129736.	129861.
LAND-USE INTENSITY RATIOS				
I. SEASONAL BY NONIRRIGATED/IRRIGATED				
A. NONIRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.192	.203	.208	.201
WINTER/(CULTIVATED-FRUIT)	.821	.866	.864	.850
B. IRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	1.059	1.054	.882	1.012
WINTER/(CULTIVATED-FRUIT)	.035	.252	.232	.173
II. NONIRRIGATED SEASONAL WITH FALLOW				
SUMMER/(CULTIVATED+FALLOW-FRUIT)	.192	.203	.208	.201
WINTER/(CULTIVATED+FALLOW-FRUIT)	.821	.866	.864	.850

MOHAFAZA: LATTAKIA

	IRRIGATED				NONIRRIGATED			
	1975	1976	1977	AVERAGE	1975	1976	1977	AVERAGE
WINTER CROPS								
LOCAL WHEAT	0	0	0	0	13143.	14439.	14757.	14113.
BARLEY	0	0	0	0	3176.	4496.	4178.	3950.
LENTILS	0	0	0	0	600.	659.	745.	668.
CHICKPEAS	0	0	0	0	543.	499.	468.	503.
DRY BROAD BEANS	0	0	0	0	36.	70.	74.	60.
RAMBLING VETCH	0	0	0	0	386.	341.	246.	324.
BITTER VETCH	0	0	0	0	254.	812.	742.	603.
FLOWERING SERN	0	0	0	0	210.	201.	196.	202.
BROAD BEANS	0	0	0	0	794.	682.	815.	764.
CABBAGE	279.	185.	109.	191.	0	0	6.	2.
CAULIFLOWER	197.	85.	72.	118.	0	0	1.	0.
MEXICAN WHEAT	0	0	0	0	14347.	8240.	6309.	9632.
SUBTOTALS	476.	270.	181.	309.	34089.	30439.	28537.	31022.
SUMMER CROPS								
COTTON	0	0	0	0	303.	4.	0	102.
TOBACCO	69.	195.	268.	177.	9694.	9688.	8063.	9148.
SUGAR BEETS	0	0	0	0	0	0	0	0
TOMATOES	1449.	4920.	3697.	3355.	1880.	1372.	1346.	1533.
POTATOES	285.	80.	127.	164.	281.	282.	301.	288.
WATERMELON	37.	24.	23.	28.	146.	90.	126.	121.
MAIZE	87.	169.	55.	104.	0	7.	1.	3.
MILLET	0	0	0	0	649.	636.	472.	586.
MUSKMELON	0	0	0	0	78.	65.	57.	67.
DRY ONIONS	12.	0	16.	9.	724.	699.	629.	684.
OKRA	46.	103.	135.	95.	460.	368.	313.	380.
EGGPLANT	680.	815.	688.	728.	28.	11.	1.	13.
PUMPKINS	2.	8.	18.	9.	83.	85.	44.	71.
HARICOT BEANS	1083.	1185.	912.	1060.	87.	99.	83.	90.
DRY HARICOT BEANS	49.	6.	120.	58.	20.	9.	8.	12.
CUCUMBERS	483.	1128.	941.	851.	155.	142.	73.	123.
SQUASH	1888.	2521.	1698.	2036.	410.	416.	384.	403.
SESAME	0	0	19.	6.	958.	1024.	936.	973.
SUNFLOWER	11.	12.	9.	11.	1.	4.	5.	3.
PEANUTS	3247.	4108.	4162.	3839.	0	0	0	0
SUBTOTALS	9428.	15274.	12888.	12530.	15957.	15001.	12842.	14600.

PERENNIALS **********								
GRAPES	5.	8.	10.	8.	643.	701.	642.	662.
OLIVES	0	0	0	0	18230.	17710.	18560.	18167.
APRICOTS	87.	69.	80.	79.	513.	504.	521.	513.
APPLES	416.	410.	388.	405.	2237.	2300.	2287.	2275.
PLUMS	80.	79.	88.	82.	329.	307.	378.	338.
GREEN PLUMS	0	0	0	0	0	0	0	0
POMEGRANATES	150.	116.	138.	135.	288.	252.	235.	258.
PEACHES	59.	49.	50.	53.	56.	56.	69.	60.
FIGS	0	0	0	0	847.	830.	760.	812.
SUBTOTALS	797.	731.	754.	761.	23143.	22660.	23452.	23085.
TOTAL CROP AREA	10701.	16275.	13823.	13600.	73189.	68100.	64831.	68707.

CULTIVATED LAND	1975	1976	1977	AVERAGE
NONIRRIGATED	69492.	73670.	71858.	71673.
IRRIGATED	13636.	16954.	17154.	15915.
FALLOW	12121.	4752.	5601.	7491.
TOTALS	95249.	95376.	94613.	95079.

LAND-USE INTENSITY RATIOS

	1975	1976	1977	AVERAGE
I. SEASONAL BY NONIRRIGATED/IRRIGATED				
A. NONIRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.344	.294	.265	.301
WINTER/(CULTIVATED-FRUIT)	.735	.557	.590	.641
B. IRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.734	.942	.786	.821
WINTER/(CULTIVATED-FRUIT)	.037	.017	.011	.022
II. NONIRRIGATED SEASONAL WITH FALLOW				
SUMMER/(CULTIVATED+FALLOW-FRUIT)	.273	.269	.238	.260
WINTER/(CULTIVATED+FALLOW-FRUIT)	.583	.546	.528	.552

MOHAFAZA: IDLEB
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	IRRIGATED				NONIRRIGATED			
	1975	1976	1977	AVERAGE	1975	1976	1977	AVERAGE
WINTER CROPS								
************								
LOCAL WHEAT	633.	117.	21.	257.	69642.	59921.	48530.	59364.
BARLEY	209.	255.	37.	167.	51989.	41078.	47129.	46732.
LENTILS	25.	68.	60.	51.	16622.	22860.	29158.	22880.
CHICKPEAS	0	0	0	0	2884.	1800.	1993.	2226.
DRY BROAD BEANS	34.	11.	0	15.	494.	1089.	536.	706.
RAMBLING VETCH	0	0	0	0	3429.	5510.	4739.	4559.
BITTER VETCH	0	0	0	0	0	0	0	0
FLOWERING SERN	0	5.	0	2.	0	512.	1545.	686.
BROAD BEANS	39.	22.	99.	53.	64.	36.	74.	58.
CABBAGE	57.	17.	24.	33.	0	0	0	0
CAULIFLOWER	2.	6.	10.	6.	0	0	0	0
MEXICAN WHEAT	3443.	5222.	4386.	4350.	12385.	31999.	18480.	20955.
SUBTOTALS	4442.	5723.	4637.	4934.	157509.	164805.	152184.	158166.
SUMMER CROPS								
************								
COTTON	5175.	5200.	5130.	5168.	7021.	3031.	3375.	4476.
TOBACCO	57.	75.	105.	79.	4893.	5077.	4533.	4834.
SUGAR BEETS	457.	462.	295.	405.	0	0	0	0
TOMATOES	814.	780.	832.	809.	2990.	2016.	2794.	2600.
POTATOES	11.	40.	83.	45.	0	20.	1.	7.
WATERMELON	382.	144.	338.	288.	27497.	21528.	16485.	21837.
MAIZE	13.	399.	318.	243.	0	0	0	0
MILLET	0	0	0	0	1119.	1392.	1340.	1284.
MUSKMELON	229.	312.	225.	255.	4450.	4636.	6331.	5139.
DRY ONIONS	45.	0	183.	76.	543.	300.	491.	445.
OKRA	35.	10.	30.	25.	214.	249.	529.	331.
EGGPLANT	484.	285.	248.	339.	0	0	0	0
PUMPKINS	10.	0	9.	6.	1198.	1714.	1061.	1324.
HARICOT BEANS	162.	79.	70.	104.	2.	0	16.	6.
DRY HARICOT BEANS	10.	118.	170.	99.	0	0	0	0
CUCUMBERS	156.	172.	195.	174.	483.	881.	984.	783.
SQUASH	18.	16.	61.	32.	197.	311.	152.	220.
SESAME	0	0	0	0	10419.	10319.	5609.	8782.
SUNFLOWER	74.	517.	213.	268.	216.	47.	663.	309.
PEANUTS	0	0	0	0	0	0	0	0
SUBTOTALS	8132.	8609.	8505.	8415.	61242.	51521.	44364.	52376.

PERENNIALS								
**********								
GRAPES	1.	1.	1.	1.	7484.	9611.	9010.	8702.
OLIVES	0	0	0	0	55648.	64373.	66103.	62041.
APRICOTS	207.	158.	156.	174.	559.	710.	788.	686.
APPLES	156.	161.	180.	166.	1903.	2628.	2653.	2395.
PLUMS	55.	61.	66.	61.	286.	278.	279.	281.
GREEN PLUMS	229.	218.	221.	223.	272.	412.	532.	405.
POMEGRANATES	351.	351.	351.	351.	517.	480.	648.	548.
PEACHES	25.	19.	21.	22.	55.	58.	64.	59.
FIGS	1.	0	0	0.	8978.	9616.	8972.	9189.
SUBTOTALS	1025.	969.	996.	997.	75702.	88166.	89049.	84306.
TOTAL CROP AREA	13599.	15301.	14138.	14346.	294453.	304492.	285597.	294847.

CULTIVATED LAND	1975	1976	1977	AVERAGE
NONIRRIGATED	303089.	285697.	295002.	294596.
IRRIGATED	13261.	13259.	12877.	13132.
FALLOW	24970.	42364.	33141.	33492.
TOTALS	341320.	341320.	341020.	341220.
LAND-USE INTENSITY RATIOS				
I. SEASONAL BY NONIRRIGATED/IRRIGATED				
A. NONIRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.269	.261	.215	.249
WINTER/(CULTIVATED-FRUIT)	.693	.834	.739	.755
B. IRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.665	.700	.716	.694
WINTER/(CULTIVATED-FRUIT)	.363	.466	.390	.406
II. NONIRRIGATED SEASONAL WITH FALLOW				
SUMMER/(CULTIVATED+FALLOW-FRUIT)	.243	.215	.186	.214
WINTER/(CULTIVATED+FALLOW-FRUIT)	.624	.687	.637	.649

MOHAFAZA: ALLEPPO
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	IRRIGATED				NONIRRIGATED			
	1975	1976	1977	AVERAGE	1975	1976	1977	AVERAGE
WINTER CROPS								
************								
LOCAL WHEAT	9847.	3744.	5270.	6287.	325324.	272613.	254073.	284003.
BARLEY	1561.	1237.	613.	1137.	194447.	222435.	229387.	215423.
LENTILS	547.	901.	740.	729.	43022.	41160.	55124.	46435.
CHICKPEAS	60.	0	5.	22.	15386.	4598.	2868.	7617.
DRY BROAD BEANS	1431.	1866.	1384.	1560.	0	0	0	0
RAMBLING VETCH	0	25.	0	8.	5069.	6262.	5368.	5566.
BITTER VETCH	0	0	0	0	970.	0	566.	512.
FLOWERING SERN	0	0	0	0	0	6642.	4624.	3755.
BROAL BEANS	431.	212.	181.	275.	0	0	0	0
CABBAGE	99.	63.	68.	77.	0	0	0	0
CAULIFLOWER	95.	51.	75.	74.	0	0	0	0
MEXICAN WHEAT	17590.	26681.	25417.	23229.	43402.	46052.	27634.	39029.
SUBTOTALS	31661.	34780.	33753.	33398.	627620.	599762.	579644.	602342.
SUMMER CROPS								
************								
COTTON	30000.	30043.	30810.	30284.	7120.	4493.	4799.	5471.
TOBACCO	35.	72.	71.	59.	14.	15.	4.	11.
SUGAR BEETS	0	0	436.	145.	0	0	0	0
TOMATOES	2513.	2014.	1536.	2021.	3335.	3299.	4295.	3643.
POTATOES	755.	513.	624.	631.	0	0	0	0
WATERMELON	280.	41.	81.	134.	16750.	18469.	31737.	22319.
MAIZE	968.	1650.	2507.	1708.	10.	0	20.	10.
MILLET	0	0	0	0	245.	581.	1109.	645.
MUSKMELON	0	18.	27.	15.	7873.	10627.	10769.	9756.
DRY ONIONS	784.	371.	789.	648.	513.	107.	307.	309.
OKRA	399.	30.	49.	159.	782.	2539.	3615.	2312.
EGGPLANT	776.	698.	582.	685.	0	0	0	0
PUMPKINS	1199.	715.	4.	639.	1531.	1482.	3100.	2038.
HARICOT BEANS	751.	192.	193.	379.	0	0	0	0
DRY HARICOT BEANS	[illegible]	312.	137.	[illegible]	0	0	0	0
CUCUMBERS	1392.	884.	734.	1003.	626.	1967.	4375.	2323.
SQUASH	598.	241.	236.	358.	628.	845.	815.	763.
SESAME	368.	1037.	719.	708.	11414.	12202.	14197.	12604.
SUNFLOWER	9.	121.	24.	51.	0	0	102.	34.
PEANUTS	2.	0	2.	1.	0	0	0	0
SUBTOTALS	40857.	38982.	39561.	39800.	50841.	56626.	79244.	62237.

PERENNIALS								
**********								
GRAPES	9.	31.	45.	28.	16314.	25282.	23468.	21688.
OLIVES	33.	31.	39.	34.	42072.	68492.	74112.	61559.
APRICOTS	764.	864.	808.	812.	134.	139.	124.	132.
APPLES	400.	391.	308.	366.	23.	50.	50.	41.
PLUMS	72.	87.	58.	72.	0	0	0	0
GREEN PLUMS	243.	271.	262.	259.	0	0	0	0
POMEGRANATES	1108.	1808.	2022.	1646.	99.	100.	100.	100.
PEACHES	75.	81.	66.	74.	0	0	0	0
FIGS	6.	6.	6.	6.	1839.	2929.	2178.	2315.
SUBTOTALS	2710.	3570.	3614.	3298.	60481.	96992.	100032.	85835.
TOTAL CROP AREA	75228.	77332.	76928.	76496.	738942.	753380.	758920.	750414.

CULTIVATED LAND	1975	1976	1977	AVERAGE
NONIRRIGATED	724255.	756276.	767487.	749339.
IRRIGATED	67230.	67225.	73532.	69330.
FALLOW	441532.	409512.	393545.	414863.
TOTALS	1233017.	1233017.	1234564.	1233533.

LAND-USE INTENSITY RATIOS

I. SEASONAL BY NONIRRIGATED/IRRIGATED				
A. NONIRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.077	.086	.119	.094
WINTER/(CULTIVATED-FRUIT)	.946	.910	.868	.908
B. IRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.633	.612	.566	.604
WINTER/(CULTIVATED-FRUIT)	.491	.546	.483	.507
II. NONIRRIGATED SEASONAL WITH FALLOW				
SUMMER/(CULTIVATED+FALLOW-FRUIT)	.046	.053	.075	.058
WINTER/(CULTIVATED+FALLOW-FRUIT)	.568	.561	.546	.558

MOHAFAZA: HASAKEH

	IRRIGATED				NONIRRIGATED			
	1975	1976	1977	AVERAGE	1975	1976	1977	AVERAGE
WINTER CROPS								
LOCAL WHEAT	3300.	2071.	1037.	2136.	438000.	384613.	366548.	396387.
BARLEY	170.	421.	844.	478.	271741.	304501.	327510.	301251.
LENTILS	241.	848.	1372.	820.	10221.	33300.	46682.	30068.
CHICKPEAS	0	11.	0	4.	1150.	2423.	106.	1226.
DRY BROAD BEANS	5.	0	0	2.	20.	0	0	7.
RAMBLING VETCH	60.	0	0	20.	247.	150.	20.	139.
BITTER VETCH	0	0	0	0	0	0	0	0
FLOWERING SERN	0	0	0	0	984.	2700.	700.	1461.
BROAD BEANS	64.	192.	223.	160.	0	0	0	0
CABBAGE	31.	50.	60.	47.	0	0	0	0
CAULIFLOWER	27.	42.	37.	35.	0	0	0	0
MEXICAN WHEAT	28518.	33112.	35972.	32534.	37000.	64617.	120235.	73951.
SUBTOTALS	32416.	36747.	39545.	36236.	759363.	792304.	861801.	804489.
SUMMER CROPS								
COTTON	38000.	36760.	36417.	37059.	0	0	0	0
TOBACCO	0	0	0	0	0	0	0	0
SUGAR BEETS	0	0	0	0	0	0	0	0
TOMATOES	632.	705.	750.	696.	0	0	0	0
POTATOES	56.	77.	124.	86.	0	0	0	0
WATERMELON	86.	130.	268.	161.	4827.	15680.	9680.	10062.
MAIZE	94.	273.	547.	305.	0	0	0	0
MILLET	0	0	0	0	0	600.	0	200.
MUSKMELON	56.	105.	132.	98.	1925.	7140.	3420.	4162.
DRY ONIONS	186.	193.	262.	214.	0	0	0	0
OKRA	70.	67.	104.	80.	0	0	0	0
EGGPLANT	251.	254.	245.	250.	0	0	0	0
PUMPKINS	16.	13.	24.	18.	0	0	0	0
HARICOT BEANS	37.	40.	49.	42.	0	0	0	0
DRY HARICOT BEANS	0	35.	32.	22.	0	0	0	0
CUCUMBERS	203.	225.	263.	230.	0	1500.	291.	597.
SQUASH	139.	169.	150.	153.	0	0	0	0
SESAME	528.	1625.	1343.	1165.	0	0	0	0
SUNFLOWER	19.	15.	0	11.	0	20.	0	7.
PEANUTS	0	0	0	0	0	0	0	0
SUBTOTALS	40373.	40686.	40710.	40590.	6752.	24940.	13391.	15028.

PERENNIALS								
**********								
GRAPES	282.	330.	575.	396.	368.	362.	425.	385.
OLIVES	3.	0	3.	2.	3.	6.	4.	4.
APRICOTS	336.	327.	330.	331.	0	0	0	0
APPLES	90.	95.	107.	97.	0	0	0	0
PLUMS	35.	30.	82.	49.	0	0	0	0
GREEN PLUMS	39.	51.	106.	65.	0	0	0	0
POMEGRANATES	80.	87.	100.	89.	0	0	1.	0.
PEACHES	55.	59.	71.	62.	0	0	0	0
FIGS	33.	28.	20.	27.	6.	7.	7.	7.
SUBTOTALS	953.	1007.	1394.	1118.	377.	375.	437.	396.
TOTAL CROP AREA	73742.	78440.	81649.	77944.	766492.	817619.	875629.	819913.

	1975	1976	1977	AVERAGE
CULTIVATED LAND				
NONIRRIGATED	786847.	900491.	826197.	837845.
IRRIGATED	71175.	78509.	80909.	76864.
FALLOW	485435.	364557.	436451.	428814.
TOTALS	1343457.	1343557.	1343557.	1343524.
LAND-USE INTENSITY RATIOS				
I. SEASONAL BY NONIRRIGATED/IRRIGATED				
A. NONIRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.009	.028	.016	.018
WINTER/(CULTIVATED-FRUIT)	.966	.880	1.044	.963
B. IRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.575	.525	.512	.537
WINTER/(CULTIVATED-FRUIT)	.462	.474	.497	.478
II. NONIRRIGATED SEASONAL WITH FALLOW				
SUMMER/(CULTIVATED+FALLOW-FRUIT)	.005	.020	.011	.012
WINTER/(CULTIVATED+FALLOW-FRUIT)	.597	.626	.683	.635

MOHAFAZA: RAQA

	IRRIGATED 1975	IRRIGATED 1976	IRRIGATED 1977	IRRIGATED AVERAGE	NONIRRIGATED 1975	NONIRRIGATED 1976	NONIRRIGATED 1977	NONIRRIGATED AVERAGE
WINTER CROPS								
LOCAL WHEAT	7321.	3947.	5450.	5573.	154329.	123619.	97812.	125253.
BARLEY	794.	508.	1752.	1018.	244547.	325770.	202056.	257458.
LENTILS	310.	1444.	1787.	1180.	0	24.	125.	50.
CHICKPEAS	0	0	40.	13.	0	0	0	0
DRY BROAD BEANS	19.	9.	108.	45.	0	0	0	0
RAMBLING VETCH	0	0	0	0	0	0	0	0
BITTER VETCH	0	0	0	0	0	0	0	0
FLOWERING SERN	0	0	0	0	0	0	0	0
BACAL BEANS	46.	33.	20.	33.	0	0	0	0
CABBAGE	0	0	0	0	0	0	0	0
CAULIFLOWER	0	0	0	0	0	0	0	0
MEXICAN WHEAT	21000.	23688.	23885.	22858.	348.	1794.	7443.	3195.
SUBTOTALS	29490.	29629.	33042.	30720.	399224.	451207.	307436.	385956.
SUMMER CROPS								
COTTON	34887.	30783.	29225.	31632.	0	0	0	0
TOBACCO	16.	0	0	5.	13.	0	0	4.
SUGAR BEETS	47.	0	2928.	992.	0	0	0	0
TOMATOES	792.	740.	372.	635.	0	0	0	0
POTATOES	71.	198.	11.	93.	0	0	0	0
WATERMELON	309.	226.	95.	210.	40.	0	0	13.
MAIZE	1545.	1668.	1006.	1406.	0	0	0	0
MILLET	41.	21.	16.	26.	0	0	0	0
MUSKMELON	8.	10.	4.	7.	10.	0	0	3.
DRY ONIONS	43.	21.	20.	28.	0	0	0	0
OKRA	137.	77.	57.	90.	0	0	0	0
EGGPLANT	250.	376.	161.	262.	0	0	0	0
PUMPKINS	20.	8.	20.	16.	0	0	0	0
HARICOT BEANS	4.	54.	14.	24.	0	0	0	0
DRY HARICOT BEANS	0	5.	8.	4.	0	0	0	0
CUCUMBERS	82.	96.	49.	76.	0	0	0	0
SQUASH	86.	94.	31.	70.	0	0	0	0
SESAME	1405.	2323.	3553.	2427.	0	0	0	0
SUNFLOWER	30.	143.	18.	64.	0	0	0	0
PEANUTS	0	0	0	0	0	0	0	0
SUBTOTALS	39773.	36843.	37588.	38068.	63.	0	0	21.

PERENNIALS								
**********								
GRAPES	87.	73.	111.	90.	8.	2.	2.	4.
OLIVES	1.	0	1.	1.	0	1.	0	0.
APRICOTS	182.	109.	188.	160.	0	0	0	0
APPLES	34.	11.	21.	22.	0	0	0	0
PLUMS	44.	15.	48.	36.	0	0	0	0
GREEN PLUMS	20.	15.	24.	20.	0	0	0	0
POMEGRANATES	75.	44.	42.	54.	0	0	0	0
PEACHES	42.	31.	83.	52.	0	0	0	0
FIGS	8.	1.	0	3.	0	2.	0	1.
SUBTOTALS	493.	299.	518.	437.	8.	5.	2.	5.
TOTAL CROP AREA	69756.	66771.	71148.	69225.	399295.	451212.	307438.	385982.

	1975	1976	1977	AVERAGE
CULTIVATED LAND				
NONIRRIGATED	399282.	424117.	406990.	410130.
IRRIGATED	69641.	62917.	60773.	64444.
FALLOW	272235.	232122.	240740.	248366.
TOTALS	741158.	719156.	708503.	722939.

LAND-USE INTENSITY RATIOS

	1975	1976	1977	AVERAGE
I. SEASONAL BY NONIRRIGATED/IRRIGATED				
A. NONIRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.000	0	0	.000
WINTER/(CULTIVATED-FRUIT)	1.000	1.064	.755	.940
B. IRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.575	.588	.624	.596
WINTER/(CULTIVATED-FRUIT)	.426	.473	.548	.483
II. NONIRRIGATED SEASONAL WITH FALLOW				
SUMMER/(CULTIVATED+FALLOW-FRUIT)	.000	0	0	.000
WINTER/(CULTIVATED+FALLOW-FRUIT)	.595	.688	.475	.586

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	IRRIGATED				NONIRRIGATED			
	1975	1976	1977	AVERAGE	1975	1976	1977	AVERAGE
WINTER CROPS								
************								
LOCAL WHEAT	7176.	1441.	2882.	3833.	19370.	16842.	33600.	23271.
BARLEY	2878.	5350.	5466.	4565.	16084.	43900.	10200.	23395.
LENTILS	347.	285.	516.	383.	0	0	0	0
CHICKPEAS	0	0	0	0	0	0	0	0
DRY BROAD BEANS	0	0	0	0	0	0	0	0
RAMBLING VETCH	0	0	0	0	0	0	0	0
BITTER VETCH	0	0	0	0	0	0	0	0
FLOWERING SERN	0	0	0	0	0	0	0	0
BROAD BEANS	267.	294.	641.	401.	0	0	0	0
CABBAGE	0	0	61.	20.	0	0	0	0
CAULIFLOWER	0	0	28.	9.	0	0	0	0
MEXICAN WHEAT	37890.	39354.	39984.	39076.	0	850.	0	283.
SUBTOTALS	48558.	46724.	49578.	48287.	35454.	61592.	43800.	46949.
SUMMER CROPS								
************								
COTTON	42628.	37783.	38455.	39622.	0	0	0	0
TOBACCO	0	0	0	0	0	0	0	0
SUGAR BEETS	0	0	547.	182.	0	0	0	0
TOMATOES	1456.	1372.	1393.	1407.	0	0	0	0
POTATOES	23.	3.	8.	11.	0	0	0	0
WATERMELON	1040.	1498.	1507.	1348.	0	0	0	0
MAIZE	800.	1253.	2612.	1555.	0	0	0	0
MILLET	1473.	171.	4072.	1905.	0	0	0	0
MUSKMELON	1188.	1302.	1134.	1208.	0	0	0	0
DRY ONIONS	213.	203.	286.	234.	0	0	0	0
OKRA	522.	441.	698.	554.	0	0	0	0
EGGPLANT	322.	326.	411.	353.	0	0	0	0
PUMPKINS	29.	36.	108.	58.	0	0	0	0
HARICOT BEANS	44.	118.	97.	86.	0	0	0	0
DRY HARICOT BEANS	0	0	486.	162.	0	0	0	0
CUCUMBERS	450.	368.	465.	428.	0	0	0	0
SQUASH	281.	197.	287.	255.	0	0	0	0
SESAME	5350.	7365.	9008.	7241.	0	0	0	0
SUNFLOWER	19.	12.	29.	20.	0	0	0	0
PEANUTS	14.	3.	1.	6.	0	0	0	0
SUBTOTALS	55852.	52451.	61604.	56636.	0	0	0	0

PERENNIALS								
**********								
GRAPES	67.	69.	88.	75.	0	0	0	0
OLIVES	8.	7.	9.	8.	0	0	0	0
APRICOTS	838.	880.	1045.	921.	0	0	0	0
APPLES	460.	477.	550.	496.	0	0	0	0
PLUMS	221.	222.	244.	229.	0	0	0	0
GREEN PLUMS	180.	201.	263.	215.	0	0	0	0
POMEGRANATES	109.	132.	149.	130.	0	0	0	0
PEACHES	16.	18.	36.	23.	0	0	0	0
FIGS	73.	75.	87.	78.	0	0	0	0
SUBTOTALS	1972.	2081.	2471.	2175.	0	0	0	0
TOTAL CROP AREA	106382.	101256.	113653.	107097.	35454.	61592.	43800.	46949.

CULTIVATED LAND	1975	1976	1977	AVERAGE
NONIRRIGATED	35454.	43000.	43000.	40485.
IRRIGATED	91432.	91432.	85676.	89513.
FALLOW	0	0	0	0
TOTALS	126886.	134432.	128676.	129998.
LAND-USE INTENSITY RATIOS				
I. SEASONAL BY NONIRRIGATED/IRRIGATED				
A. NONIRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	0	0	0	0
WINTER/(CULTIVATED-FRUIT)	1.000	1.432	1.019	1.150
B. IRRIGATED				
SUMMER/(CULTIVATED-FRUIT)	.624	.587	.740	.651
WINTER/(CULTIVATED-FRUIT)	.543	.523	.596	.554
II. NONIRRIGATED SEASONAL WITH FALLOW				
SUMMER/(CULTIVATED+FALLOW-FRUIT)	0	0	0	0
WINTER/(CULTIVATED+FALLOW-FRUIT)	1.000	1.432	1.019	1.150

MOHAFEZA HOMS

MONTIKA: RASTAN
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	IRRIGATED				NONIRRIGATED			
	1975	1976	1977	AVERAGE	1975	1976	1977	AVERAGE
WINTER CROPS								
************								
LOCAL WHEAT	1750.	1108.	865.	1241.	5297.	4798.	4140.	4745.
BARLEY	462.	408.	153.	341.	2718.	2174.	2250.	2381.
LENTILS	153.	213.	172.	179.	484.	524.	355.	454.
CHICKPEAS	243.	179.	0	141.	412.	253.	82.	249.
DRY BROAD BEANS	139.	382.	398.	303.	0	10.	61.	24.
RAMBLING VETCH	117.	182.	117.	139.	644.	450.	582.	559.
BITTER VETCH	84.	62.	0	49.	56.	126.	197.	126.
FLOWERING SERN	4.	45.	10.	20.	18.	61.	67.	49.
BROAD BEANS	76.	37.	20.	44.	0	0	0	0
CABBAGE	18.	20.	22.	20.	0	0	0	0
CAULIFLOWER	28.	28.	34.	30.	0	0	0	0
MEXICAN WHEAT	565.	878.	992.	812.	0	385.	300.	228.
SUBTOTALS	3639.	3542.	2773.	3318.	9629.	8781.	8034.	8815.
SUMMER CROPS								
************								
COTTON	2376.	2240.	2349.	2322.	0	0	0	0
TOBACCO	0	0	0	0	0	0	0	0
SUGAR BEETS	1773.	2015.	1667.	1818.	0	0	0	0
TOMATOES	163.	212.	166.	180.	0	5.	0	2.
POTATOES	62.	134.	399.	198.	0	0	14.	5.
WATERMELON	0	0	0	0	175.	291.	248.	238.
MAIZE	244.	232.	219.	232.	0	0	0	0
MILLET	0	0	0	0	546.	703.	482.	577.
MUSKMELON	0	0	0	0	20.	43.	25.	29.
DRY ONIONS	1674.	1310.	1547.	1510.	0	0	0	0
OKRA	26.	51.	46.	41.	0	0	0	0
EGGPLANT	97.	126.	126.	116.	0	0	0	0
PUMPKINS	8.	3.	2.	4.	0	0	0	0
HARICOT BEANS	44.	50.	47.	47.	0	0	0	0
DRY HARICOT BEANS	1080.	1557.	1418.	1352.	0	0	0	0
CUCUMBERS	68.	74.	44.	62.	0	0	0	0
SQUASH	67.	128.	110.	102.	0	0	0	0
SESAME	0	0	0	0	0	0	0	0
SUNFLOWER	22.	16.	15.	18.	0	0	0	0
PEANUTS	0	0	0	0	0	0	0	0
SUBTOTALS	7704.	8148.	8155.	8002.	741.	1042.	769.	851.

PERENNIALS								
**********								
GRAPES	334.	330.	332.	332.	605.	672.	681.	653.
OLIVES	0	0	0	0	0	0	0	0
APRICOTS	21.	22.	23.	22.	0	0	0	0
APPLES	13.	11.	16.	13.	0	3.	0	1.
PLUMS	4.	4.	7.	5.	0	0	0	0
GREEN PLUMS	5.	5.	6.	5.	0	0	0	0
POMEGRANATES	17.	16.	17.	17.	0	0	0	0
PEACHES	25.	27.	32.	28.	0	0	0	0
FIGS	22.	22.	22.	22.	1.	1.	1.	1.
SUBTOTALS	441.	437.	455.	444.	606.	676.	682.	655.
TOTAL CROP AREA	11784.	12127.	11383.	11765.	10976.	10499.	9485.	10320.

CULTIVATED LAND	1975	1976	1977	AVERAGE
NONIRRIGATED		10520.	9764.	10142.
IRRIGATED		11048.	10954.	11001.
FALLOW		7203.	8053.	7628.
TOTALS		28771.	28771.	28771.

LAND-USE INTENSITY RATIOS

I. SEASONAL BY NONIRRIGATED/IRRIGATED			
A. NONIRRIGATED			
SUMMER/(CULTIVATED-FRUIT)	.106	.085	.095
WINTER/(CULTIVATED-FRUIT)	.892	.885	.888
B. IRRIGATED			
SUMMER/(CULTIVATED-FRUIT)	.768	.777	.772
WINTER/(CULTIVATED-FRUIT)	.334	.264	.299
II. NONIRRIGATED SEASONAL WITH FALLOW			
SUMMER/(CULTIVATED+FALLOW-FRUIT)	.061	.045	.053
WINTER/(CULTIVATED+FALLOW-FRUIT)	.515	.469	.492

MOHAFEZA HOMS

MONTIKA: MOKHRAM
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	IRRIGATED				NONIRRIGATED			
	1975	1976	1977	AVERAGE	1975	1976	1977	AVERAGE
WINTER CROPS								
************								
LOCAL WHEAT	72.	98.	40.	70.	20260.	17302.	17540.	18367.
BARLEY	25.	123.	44.	64.	17795.	15629.	19385.	17603.
LENTILS	3.	60.	20.	28.	1276.	1627.	1238.	1380.
CHICKPEAS	0	0	0	0	5.	5.	0	3.
DRY BROAD BEANS	17.	0	0	6.	0	0	0	0
RAMBLING VETCH	0	0	0	0	1271.	1367.	1031.	1223.
BITTER VETCH	0	0	0	0	3308.	3435.	3628.	3457.
FLOWERING SERN	0	0	0	0	50.	60.	60.	57.
LOCAL BEANS	11.	29.	28.	23.	25.	36.	30.	30.
CABBAGE	1.	1.	2.	1.	0	0	0	0
CAULIFLOWER	7.	5.	6.	6.	0	0	0	0
MEXICAN WHEAT	43.	65.	45.	51.	0	0	0	0
SUBTOTALS	179.	381.	185.	248.	43990.	39461.	42912.	42121.
SUMMER CROPS								
************								
COTTON	242.	232.	0	158.	0	0	0	0
TOBACCO	0	0	0	0	0	0	3.	1.
SUGAR BEETS	0	0	0	0	0	0	0	0
TOMATOES	21.	14.	16.	17.	0	0	0	0
POTATOES	7.	3.	10.	7.	0	0	0	0
WATERMELON	1.	0	0	0.	493.	566.	325.	461.
MAIZE	8.	19.	11.	13.	0	0	0	0
MILLET	0	0	0	0	0	0	0	0
MUSKMELON	0	0	0	0	67.	125.	60.	84.
DRY ONIONS	17.	23.	54.	31.	0	0	0	0
OKRA	2.	1.	2.	2.	1.	0	0	0.
EGGPLANT	9.	10.	10.	10.	0	0	0	0
PUMPKINS	5.	0	0	2.	0	2.	0	1.
HARICOT BEANS	2.	4.	28.	11.	0	0	0	0
DRY HARICOT BEANS	25.	16.	6.	16.	0	0	0	0
CUCUMBERS	25.	20.	19.	21.	0	0	0	0
SQUASH	2.	1.	2.	2.	0	0	0	0
SESAME	0	0	0	0	0	0	0	0
SUNFLOWER	0	0	0	0	0	0	0	0
PEANUTS	0	0	0	0	0	0	0	0
SUBTOTALS	366.	343.	158.	289.	561.	693.	388.	547.

PERENNIALS ***********								
GRAPES	3.	3.	5.	4.	3893.	4027.	4028.	3983.
OLIVES	0	0	0	0	1.	4.	4.	3.
APRICOTS	9.	10.	9.	9.	0	0	0	0
APPLES	5.	5.	4.	5.	0	0	0	0
PLUMS	1.	1.	0	1.	0	0	1.	0.
GREEN PLUMS	1.	1.	1.	1.	0	0	0	0
POMEGRANATES	2.	2.	2.	2.	0	0	1.	0.
PEACHES	4.	5.	4.	4.	3.	2.	2.	2.
FIGS	3.	4.	4.	4.	7.	6.	6.	6.
SUBTOTALS	28.	31.	29.	29.	3904.	4039.	4042.	3995.
TOTAL CROP AREA	573.	755.	372.	567.	48455.	44193.	47342.	46663.

CULTIVATED LAND	1975	1976	1977	AVERAGE
NONIRRIGATED		44802.	43944.	44373.
IRRIGATED		767.	500.	634.
FALLOW		38892.	38542.	38717.
TOTALS		84461.	82986.	83724.

LAND-USE INTENSITY RATIOS

	1976	1977	AVERAGE
I. SEASONAL BY NONIRRIGATED/IRRIGATED			
A. NONIRRIGATED			
SUMMER/(CULTIVATED-FRUIT)	.017	.010	.013
WINTER/(CULTIVATED-FRUIT)	.968	1.075	1.022
B. IRRIGATED			
SUMMER/(CULTIVATED-FRUIT)	.466	.335	.401
WINTER/(CULTIVATED-FRUIT)	.518	.393	.455
II. NONIRRIGATED SEASONAL WITH FALLOW			
SUMMER/(CULTIVATED+FALLOW-FRUIT)	.009	.005	.007
WINTER/(CULTIVATED+FALLOW-FRUIT)	.495	.547	.521

Syria: Agricultural Sector Assessment

Volume 3: Agricultural Production Annex

CHAPTER II

CROP AND LIVESTOCK TRENDS

Based on the work of

the CRIES project

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PREFACE

This chapter on crop and livestock trends in Syria contains much of the information developed by the Comprehensive Resource Inventory and Evaluation System (CRIES) project staff. The statistical data presented in this chapter, however, are primarily of a summary nature, and the detailed data tables upon which they are based are located in the technical files of the sector assessment project.

A major part of the crop trends and area response analyses was carried out by Daniel E. Kugler and James B. Johnson of the Economics, Statistics, and Cooperatives Service, USDA, with assistance from Larry M. Boone, Mark J. Cochran, and John W. Putman. Development of computer programs was led by Weldon Lodwick of the Department of Resource Development, MSU, with assistance from Mark Simon, Jaime Cordera, Julia Miller and James Calme. The livestock trend and feed requirement aspects were prepared by James G. Robb of the Department of Agricultural Economics, MSU, while the livestock product trends were prepared by Daniel E. Kugler, with computer programming assistance from Mark Simon.

Hamed Safadi, Head of the Agricultural Statistics Division, and Fouad Kardouss, Head of the Utilization Division, Ministry of Agriculture and Agrarian Reform, collaborated in assembling information and assuring accuracy and usefulness of data used for agricultural resource planning activities. Additional assistance was provided by Farouk Othman and Faries Sowaff, Agricultural Statistics Division, MAAR, and by Nour Barmada and Khalid Ubery, State Planning Commission.

CROP AND LIVESTOCK TRENDS

A. Introduction

Trends in crop and livestock output reflect persistent influences to which farmers have responded in the past. These influences may be physical, such as long-term shifts in climate, changes in availability of land, pest infestations, development of improved varieties of crops or breeds of livestock, or introduction of improved production technologies. The influences may be the result of policy decisions to expand or limit production of specific crops or livestock products. The influences may also be economic, such as changes in market cost-price relationships, and may be independent of, or more generally, interrelated with physical and policy influences.

Since these different influences usually operate simultaneously, with some off-setting and some augmenting each other, it is not possible to identify quantitatively the contributions of each. However, the trends reflect the combined net effects. Taken together with general knowledge of associated influences, the trends provide useful guidelines that should be taken into account in planning for the future.

This chapter presents the results of trend analyses made for the period 1968-1977 on area, production and yield of major crops, together with discussion of efforts made to predict areas of various crops planted in response to certain variables as prices and weather. Also included are analyses of trends in numbers of the several kinds of livestock, and trends in production of livestock products for the same period. In addition, comparisons are made between livestock feed requirements and feed supplies. The data sources and methodologies used in these analyses are presented in the Appendices.

B. Trends in Major Crops

Area, production and yield trends for selected major crops were developed using simple linear regressions for ten years (1968-1977) at the national, regional (Mohafaza), and subregional (Mantika) levels. The statistical procedures used to obtain the trend estimates are given in Appendix 1.

National Trends

Winter Crops

Nonirrigated. No significant production or yield trends were found for the 1968-1977 period (Table 1). Significant upward trends in area planted were

Table 1. -- Estimated National Trends in Area, Production and Yield of Nonirrigated Winter Crops: Average Annual Change and Ten Year Average, Syrian Arab Republic, 1968-1977.

CROP	AREA		PRODUCTION		YIELD	
	Average Annual Change (hectares)	10 Year Average (hectares)	Average Annual Change (metric tons)	10 Year Average (metric tons)	Average Annual Change (kilograms/hectare)	10 Year Average (kilograms/hectare)
Total Wheat	52,145**	1,260,751	61,855	930,371	19	732
Barley	44,726	825,141	22,736	488,497	- 16	637
Lentils	3,533	115,662	4,660	77,714	19	671
Chickpeas	2,134	52,589	343	34,878	- 21	673
Dry Broad Beans	- 285*	3,841	- 118	3,564	40	962
Rambling Vetch	1,086*	34,179	1,223	23,979	16	700
Bitter Vetch	638**	22,849	- 348	14,283	- 33	626
Flowering Sern	1,046*	6,976	650	5,712	- 15	817
Broad Beans	131**	2,202	689	10,098	91	4,516
Cabbage	- 1	8	- 1	104	1,354	8,067
Cauliflower	1	2	12	47	1,564	6,200

NOTE: Values marked with a single asterisk (*) denote slope (average annual change) parameter estimates significantly different from zero at the 5 percent level of significance in a two-tailed t test; those marked with a double asterisk (**) denote significant slope parameter estimates at the 1 percent level of significance. Parameter estimates were made using simple linear regression analysis.

demonstrated for total wheat, rambling vetch, bitter vetch, flowering sern and broad beans. The occurrence of significant area planted trends without significant production or yield trends under uncertain weather conditions suggests that achievement of stability in dryland crop production has been pursued through the expansion of area planted, rather than through yield improvement through technology introductions.

Irrigated. The majority of irrigated winter crops demonstrated significant upward trends in area planted and in production, the exceptions being lentils and rambling vetch (Table 2). Significant yield improvement has occurred in total wheat, lentils, broad beans, cabbage and cauliflower. Total wheat, broad beans, cabbage and cauliflower demonstrated significant upward trends in area, production and yield.

Summer Crops

Nonirrigated. Several of the nonirrigated summer crops demonstrated significant upward trends in area planted over the 1968-1977 period (Table 3). Included in this group are tobacco, tomatoes, potatoes, maize, dry onions, okra, pumpkins, squash and sesame. All of these crops except maize and okra demonstrated significant average annual changes in production for the same period. Cotton and millet demonstrated decreases in area planted.

During this period, significant yield improvement was found for dry onions, eggplant, pumpkins and haricot beans. Okra demonstrated a significant downward yield trend.

Only dry onions and pumpkins had significant upward trends in area, production and yield.

Irrigated. With the exceptions of cotton, tobacco, sugar beets, millet, pumpkins and sunflower, all irrigated summer crops demonstrated significant upward trends in both area planted and production for the 1968-1977 period (Table 4). Sunflowers had a significant upward trend in area planted. Cotton recorded a significant downward trend in area planted counterbalanced by a significant upward trend in yield to maintain a relatively constant (no trend) production level.

Significant upward trends in yield were recorded for cotton, tobacco, tomatoes, maize, muskmelon, dry onions, okra, eggplant, haricot beans, dry haricot beans, cucumbers and squash.

Significant upward trends in area planted, production and yield were found for tomatoes, maize, muskmelon, dry onions, okra, eggplant, haricot beans, dry haricot beans, cucumbers and squash.

Table 2. -- Estimated National Trends in Area, Production and Yield of Irrigated Winter Crops: Average Annual Change and Ten Year Average, Syrian Arab Republic, 1968-1977.

CROP	AREA		PRODUCTION		YIELD	
	Average Annual Change (hectares)	10 Year Average (hectares)	Average Annual Change (metric tons)	10 Year Average (metric tons)	Average Annual Change (kilograms/hectare)	10 Year Average (kilograms/hectare)
Total Wheat	14,828**	127,541	40,348**	235,634	123*	1,718
Barley	- 21	13,995	1,402*	19,305	88	1,410
Lentils	129	3,600	397	3,964	55*	1,047
Chickpeas	45*	254	49*	298	-23	1,176
Dry Broad Beans	131	3,558	- 511*	6,309	66	1,760
Rambling Vetch	- 23	342	- 10	435	31	1,292
Bitter Vetch	25*	95	27*	107	-13	1,137
Flowering Sern	84*	891	127*	1,103	23	1,208
Broad Beans	234**	2,942	3,261**	21,718	500**	7,047
Cabbage	227**	1,864	5,660**	33,574	866**	17,111
Cauliflower	294**	1,777	5,972**	29,356	681**	15,588

NOTE: Values marked with a single asterisk (*) denote slope (average annual change) parameter estimates significantly different from zero at the 5 percent level of significance in a two-tailed t test; those marked with a double asterisk (**) denote significant slope parameter estimates at the 1 percent level of significance. Parameter estimates were made using simple linear regression analysis.

Table 3. -- Estimated National Trends in Area, Production and Yield of Nonirrigated Summer Crops: Average Annual Change and Ten Year Average, Syrian Arab Republic, 1968-1977.

CROP	AREA		PRODUCTION		YIELD	
	Average Annual Change (hectares)	10 Year Average (hectares)	Average Annual Change (metric tons)	10 Year Average (metric tons)	Average Annual Change (kilograms/hectare)	10 Year Average (kilograms/hectare)
Cotton	-4,918*	26,508	-1,618	8,836	16	319
Tobacco	772**	13,749	429*	9,255	- 9	678
Sugar Beets	148	674	3,290	15,503	2,448	9,136
Tomatoes	945**	7,622	3,598*	35,168	- 70	4,693
Potatoes	130*	1,090	1,467*	10,551	487	8,827
Watermelon	2,988	58,536	31,120	378,114	184	6,113
Maize	229*	2,477	203	2,058	10	811
Millet	-1,407*	24,487	-1,419	17,259	- 11	688
Muskmelon	82	17,951	7,626	117,117	413	6,289
Dry Onions	124*	1,681	1,032**	9,695	252*	5,571
Okra	435**	2,243	365	4,039	- 171**	2,053
Eggplant	2	5	14	44	939*	3,022
Pumpkins	452**	2,028	4,085**	14,512	615*	5,745
Haricot Beans	- 16	286	- 65	1,134	- 11	3,993
Dry Haricot Beans	4	60	5**	42	45**	679
Cucumbers	332	5,436	1,767	24,848	41	4,390
Squash	82**	1,274	648*	9,549	11	7,440
Sesame	2,735**	16,748	679*	4,561	- 13	280
Sunflower	188	1,329	111	1,140	- 37	825
Peanuts	-	-	-	-	-	-

NOTE: Values marked with a single asterisk (*) denote slope (average annual change) parameter estimates significantly different from zero at the 5 percent level of significance in a two-tailed t test; those marked with a double asterisk (**) denote significant slope parameter estimates at the 1 percent level of significance. Parameter estimates were made using simple linear regression analysis.

Table 4. --Estimated National Trends in Area, Production and Yield of Irrigated Summer Crops: Average Annual Change and Ten Year Average, Syrian Arab Republic, 1968-1977.

CROP	AREA		PRODUCTION		YIELD	
	Average Annual Change (hectares)	10 Year Average (hectares)	Average Annual Change (metric tons)	10 Year Average (metric tons)	Average Annual Change (kilograms/hectare)	10 Year Average (kilograms/hectare)
Cotton	-7,905**	204,260	1,353	394,252	82**	1,954
Tobacco	44	473	88	696	178**	1,180
Sugar Beets	88	7,820	1,243	188,813	- 65	24,231
Tomatoes	996**	15,824	32,835**	279,057	981**	17,102
Potatoes	716*	6,642	10,680**	88,561	237	13,155
Watermelon	473**	2,586	6,223**	34,703	81	14,484
Maize	2,118**	10,009	5,142**	19,804	72*	1,787
Millet	160	2,077	311	2,525	46	1,161
Muskmelon	138*	1,253	2,547**	15,641	627**	12,053
Dry Onions	247**	5,424	10,212**	86,407	1,172**	15,453
Okra	104**	1,687	1,150**	8,863	376**	5,063
Eggplant	263**	5,321	7,907**	76,674	766**	14,081
Pumpkins	45**	742	1,046**	9,165	674	11,428
Haricot Beans	277**	3,120	2,630**	20,975	242*	6,521
Dry Haricot Beans	419**	3,711	793**	5,709	35*	1,493
Cucumbers	534**	6,874	14,125**	86,881	1,105**	11,843
Squash	439**	4,048	8,729**	56,148	657**	13,215
Sesame	1,182**	6,681	885**	5,421	- 13	818
Sunflower	234*	1,154	330	1,881	- 25	1,646
Peanuts	423*	11,225	757*	19,843	3	1,763

NOTE: Values marked with a single asterisk (*) denote slope (average annual change) parameter estimates significantly different from zero at the 5 percent level of significance in a two-tailed t test; those marked with a double asterisk (**) denote significant slope parameter estimates at the 1 percent level of significance. Parameter estimates were made using simple linear regression analysis.

Perennial (Fruit) Crops

Nonirrigated. Grapes, olives, apples, plums, green plums and peaches demonstrated upward trends in planted area (Table 5). All upward trends in area planted were accompanied by significant increases in total production. Only plums, green plums and peaches had significant yield increases.

Irrigated. Significant upward trends in area, production and yield were found for apricots, apples, plums and peaches (Table 6). Upward trends in area planted were found for olives, green plums and pomegranates, with a downward area planted trend for figs. Increasing yield trends were recorded for grapes and figs. Green plum production was also shown to have an upward trend.

Summary

The trend for crops with significant changes in area planted are aggregated to provide an overall view of the fluctuations in planting by crop groups (winter and summer, annuals and perennials) for the 10-year period, 1968-1977, as shown in the following tabulation.

Aggregated, Significant Estimated Trends in Area Planted to Annual and Perennial Crops, 1968-1977.

Crop Group	Nonirrigated Trend (hectares)	Irrigated Trend (hectares)	Total (hectares)
Annuals:			
Winter	54,761	15,737	70,498
Summer	- 421	+ 703	+ 282
Subtotal	54,340	16,440	70,780
Perennials (Fruit)	15,238	1,230	16,468
All Crops	69,578	17,670	87,248

This suggests that there has been an average annual increase of 87,248 hectares planted in Syria during the 1968-1977 period. Care must be taken to understand that this does not necessarily only imply that this was the average annual expansion of agricultural crops into land not previously used for crops. The aggregate, average hectare increase per year also reflects increased intensification of agricultural production through intercropping and multiple cropping and changes in rotation that reduce the use of fallow.

Table 5. -- Estimated National Trends in Area, Production and ield of Nonirrigated Perennial (Fruit) Crops: Average Annual Change and Ten Year Average, Syrian Arab Republic, 1968-1977.

CROP	AREA		PRODUCTION		YIELD	
	Average Annual Change (hectares)	10 Year Average (hectares)	Average Annual Change (metric tons)	10 Year Average (metric tons)	Average Annual Change metric tons per 1000 fruit bearing trees	10 Year Average
Grapes	3,343**	70,630	12,374*	209,199	.00	1.00
Olives	10,680**	162,794	11,105*	136,270	.09	2.70
Apricots	1	1,557	107	2,091	.15	4.20
Apples	1,012**	5,272	2,045**	12,104	.27	6.50
Plums	122**	592	407**	2,092	.67	6.90
Green Plums	35*	314	52**	338	.41*	3.30
Pomegranates	19	1,004	127	3,485	.10	3.30
Peaches	46**	178	102**	396	.52*	4.10
Figs	- 100	20,349	-1,283	39,245	-.12	3.70

NOTE: Values marked with a single asterisk (*) denote slope (average annual change) parameter estimates significantly different from zero at the 5 percent level of significance in a two-tailed t test; those marked with a double asterisk (**) denote significant slope parameter estimates at the 1 percent level of significance. Parameter estimates were made using simple linear regression analysis.

Table 6. --Estimated National Trends in Area, Production and Yield of Irrigated Perennial (Fruit) Crops: Average Annual Change and Ten Year Average, Syrian Arab Republic, 1968-1977.

CROP	AREA		PRODUCTION		YIELD	
	Average Annual Change (hectares)	10 Year Average (hectares)	Average Annual Change (metric tons)	10 Year Average (metric tons)	Average Annual Change (metric tons per 1000 fruit bearing trees)	10 Year Average
Grapes	-53	5,488	934	34,185	.10*	1.20
Olives	175**	4,239	206	9,567	-.07	4.70
Apricots	153**	9,096	2,935*	29,751	.41**	3.60
Apples	493**	7,157	3,264**	29,533	.22*	5.30
Plums	63**	1,642	705**	6,387	.19*	3.80
Green Plums	90**	1,615	931**	6,526	.07	3.10
Pomegranates	156**	2,561	275	15,362	-.07	3.90
Peaches	134**	2,085	1,495**	9,835	.27*	3.60
Figs	-34*	909	- 101	3,935	.33*	5.20

NOTE: Values marked with a single asterisk (*) denote slope (average annual change) parameter estimates significantly different from zero at the 5 percent level of significance in a two-tailed t test; those marked with a double asterisk (**) denote significant slope parameter estimates at the 1 percent level of significance. Parameter estimates were made using simple linear regression analysis.

Also, in some instances the aggregated trend estimates may be misleading. For example, the trend for nonirrigated summer annuals indicates an average annual decrease of 421 hectares per year which appears to be relatively stable and small by comparison with the winter annuals increase. However, cotton and millet are the only two nonirrigated summer annuals which have decreasing average annual area planted, a combined decrease of more than 6,300 hectares. There are nine other nonirrigated summer annuals which combine to nearly offset cotton and millet's decrease.

Although nearly 63 percent of the aggregate average annual 87,248 hectare increase is attributable to nonirrigated winter crops, no corresponding significant production or yield trends were found. This would generally indicate that production stability in nonirrigated annuals has been achieved through expansion of cropland. For the remainder of the crop groups, significant production trends tend to accompany significant area trends and significant yield trends tend to occur much more frequently under irrigated conditions.

Mohafaza and Mantika Trends

Significant area, production and yield trends are summarized for the Mohafaza and Mantika in Table 7 and Table 8, respectively. Parameter estimates were tested to be significantly different from zero at a 5-percent level of confidence using a two-tailed test. A slope parameter estimate must be found significant and the regression equation must have an R^2 greater than or equal to .80 to be included in the summary table.

It should be noted that trends differ considerably among the Manatik in a Mohafaza and between individual Manatik and the Mohafaza. This is indicative of the need to carefully assess the impacts of planning and policy decisions at the subregional level, preferably by Resource Planning Unit where adaptability and suitability of soils and climate may be considered in projecting trends.

Data on the complete trend analysis for Mantika and Mohafaza are located in the technical files of the sector assessment project.

Table 7. -- Summary of Significant Trends in Area, Production and Yield for Selected Major Crops by Mohafaza (5-percent confidence level, R^2 greater than or equal to .80).

Mohafaza	Crop	Nonirrigated Area	Nonirrigated Production	Nonirrigated Yield	Irrigated Area	Irrigated Production	Irrigated Yield
Damascus	Chickpeas	+ 369					
	Rambling Vetch				- 35		
	Tomatoes				+ 266		
	Maize				+ 132	+ 316	
	Okra					+ 265	
	Eggplant				+ 153	+3,230	
	Haricot Beans				+ 56	+ 592	
	Cucumbers					+1,870	
	Squash				+ 133	+2,733	+ 961
	Sunflower					- 2	
	Grapes	+ 755			- 169		
	Olives				+ 121		
	Apricots				+ 200		
	Apples	+ 111			+ 389		
	Plums					+ 402	+ 2
	Pomegranates			+ 1			
	Figs	+ 242					
Dar'a	Dry Onions						+1,582
	Pumpkins						-2,131
	Grapes	+ 13			+ 2		
	Olives				+ 71	+ 39	
	Plums	+ 1	+ 4			+ 61	
	Pomegranates				+ 5	+ 34	
	Peaches			+ 3	+ 22	+ 147	+ 3

Continued

NOTE: Each table entry is the estimated slope parameter from area, production or yield trend (regression) analysis. The parameter estimate was found significant at the 5 percent confidence level and the regression equation demonstrated an R^2 greater than or equal to .80. The estimated slope parameter represents the average annual change for the 1968-1977 period, where the units are: area in hectares per year, production in metric tons per year, annual crop yield in kilograms per hectare per year, and perennial (fruit) yields in metric tons per 1000 fruit bearing trees per year.

Table 7. Continued

Mohafaza	Crop	Nonirrigated Area	Nonirrigated Production	Nonirrigated Yield	Irrigated Area	Irrigated Production	Irrigated Yield
Sweida	Olives	+ 103					
	Apples	+ 314					
	Peaches		+ 4				
Qunitra	Apples	+ 3					
Homs	Bitter Vetch	+ 882					
	Flowering Sern	+ 270	+ 222				
	Cabbage				+ 89		
	Tomatoes					+3,944	
	Potatoes				+ 328		
	Cotton					-1,116	
	Maize				+ 433	+ 794	
	Dry Haricot Beans				+ 162	+ 266	
	Cucumbers						+ 947
	Squash					+ 654	+ 972
	Grapes	+ 954					
	Olives	+ 270					
	Apples				+ 37		
Hama	Lentils		+ 848	+ 111			
	Okra				- 14		
	Eggplant						+2,327
	Haricot Beans						+ 624
	Dry Haricot Beans				+ 54	+ 89	
	Apples	+ 8					
	Plums	+ 3					
	Peaches	+ 1					
	Figs	+ 88					
Ghab	Grapes	+ 87	+ 187			+ 8	
	Olives	+ 43					
	Apricots	+ 2					
	Apples				+ 3		
	Pomegranates				+ 7		
	Peaches	+ 1			+ 6		

Continued

Table 7. Continued

Mohafaza	Crop	Nonirrigated Area	Nonirrigated Production	Nonirrigated Yield	Irrigated Area	Irrigated Production	Irrigated Yield
Tartous	Total Wheat	+1,821					
	Cabbage					+ 853	+1,781
	Tomatoes	+ 77			+4,060	+1,517	
	Watermelon	- 274					
	Dry Onions				- 34	- 228	
	Okra	+ 25			+ 11		
	Squash				+ 82	+1,794	
	Grapes	+ 139			+ 5		
	Olives	+3,999			- 2		
	Apricots	+ 21			+ 8		
	Apples	+ 85			+ 35		
	Plums	+ 11	+ 24		+ 14		
	Green Plums	+ 2					
	Pomegranates				+ 14		
	Peaches	+ 6	+ 8				
Lattakia	Chickpeas	- 49					
	Dry Onions	+ 55			- 29		
	Dry Haricot Beans	- 4					
	Cucumbers	- 55					
	Olives	+ 473					
	Apricots	+ 15					
	Apples	+ 213	+1,318				
	Figs	- 377	-1,720				
Idleb	Total Wheat					+1,958	
	Cabbage				- 21		
	Tobacco	+ 446			+ 11		
	Apples	+ 269					
	Plums	+ 32					

Continued

Table 7. Continued

Mohafaza	Crop	Nonirrigated Area	Nonirrigated Production	Nonirrigated Yield	Irrigated Area	Irrigated Production	Irrigated Yield
Alleppo	Total Wheat				+3,366	+9,322	
	Broad Beans	- 8	- 9				
	Cotton				-1,503		+ 127
	Tobacco				+ 8	+ 13	
	Tomatoes						+2,285
	Watermelon			+ 943			+1,602
	Dry Onions						+1,747
	Apricots				+ 25		
	Green Plums				+ 19		
Hasakeh	Total Wheat				+4,594		
	Cotton					+5,263	+ 112
	Apples				+ 8		
	Figs		+ 1				
Raqa	Cotton				-3,407		+ 107
Dier El Zor	Tomatoes				+ 81	+1,936	
	Watermelon					+2,862	
	Muskmelon						+ 797
	Eggplant				+ 27	+ 416	
	Pumpkins						+1,351
	Cucumbers						+1,358
	Squash					+ 315	+ 700
	Grapes					+ 74	
	Olives					+ 2	
	Apricots				+ 77	+ 220	
	Plums				+ 11		
	Green Plums				+ 23	+ 93	
	Peaches					+ 6	
	Figs					+ 81	

Table 8. -- Summary of Significant Trends in Area, Production and Yield for Selected Major Crops by Montika (5-percent confidence level, R^2 greater than or equal to .80).

Montika	Crop	Nonirrigated			Irrigated		
		Area	Production	Yield	Area	Production	Yield
Damascus	Dry Broad Beans					+ 195	
	Tomatoes				+ 93	+2,410	
	Potatoes				+ 82	+1,715	
	Okra				+ 34	+ 219	
	Eggplant					+2,407	
	Haricot Beans				+ 35	+ 337	
	Cucumbers					+ 341	
	Squash				+ 65	+1,501	
	Olives				+ 83		
	Apricots				+ 87		
	Plums				+ 34	+ 247	+ 2
Duma	Dry Broad Beans				+ 28		
	Maize				+ 70	+ 157	
	Squash				+ 55		
	Sunflower				- 1	- 1	
	Grapes				- 76		
	Olives				+ 43		
	Apricots				+ 133	+1,018	
	Apples				+ 18		
	Plums				+ 23		
	Green Plums				+ 17		
	Pomegranates				+ 8		
	Peaches				+ 13	+ 167	

Continued

NOTE: Each table entry is the estimated slope parameter from area, production or yield trend (regression) analysis. The parameter estimate was found significant at the 5 percent confidence level and the regression equation demonstrated an R^2 greater than or equal to .80. The estimated slope parameter represents the average annual change for the 1968-1977 period, where the units are: area in hectares per year, production in metric tons per year, annual crop yield in kilograms per hectare per year, and perennial (fruit) yields in metric tons per 1000 fruit bearing trees per year.

Table 8. Continued

Montika	Crop	Nonirrigated Area	Nonirrigated Production	Nonirrigated Yield	Irrigated Area	Irrigated Production	Irrigated Yield
El Tal	Barley	+ 113					
	Bitter Vetch	+ 74					
	Potatoes						+1,533
	Haricot Beans				+ 22	+ 901	
	Grapes		+ 297				
	Olives	+ 7					
	Apricots	+ 2			+ 16	+ 107	
	Apples	+ 52				+ 134	
	Green Plums				+ 1	+ 5	
	Pomegranates			+ 1			
	Figs		+ 331				
Qatana	Grapes				+ 12	+ 163	+ 2
	Apples	+ 2	+ 5	+ 3			
	Figs	- 9			+ 2		
Zabadani	Squash						+1,398
	Grapes				+ 1		
	Apricots				+ 9		
	Apples	+ 9			+ 356		
	Figs			- 2			
Nabek	Tomatoes						+5,394
	Eggplant				- 1		
	Squash				+ 2		+4,220
	Grapes	- 6			+ 1		
	Apricots				+ 13		
	Apples	+ 49			+ 14		
	Green Plums				+ 1		
	Peaches				+ 1		
Qatifa	Grapes				- 43		
	Olives				+ 1		

Continued

Table 8. Continued

Montika	Crop	Nonirrigated Area	Nonirrigated Production	Nonirrigated Yield	Irrigated Area	Irrigated Production	Irrigated Yield
Dar'a	Dry Onions						+1,585
	Pumpkins				- 2	- 23	-2,200
	Grapes	+ 20					
	Olives				+ 53		
	Apples				- 3		
	Plums				+ 10	+ 63	
	Pomegranates				+ 4	+ 31	
	Peaches			+ 4	+ 22	+ 140	+ 3
Izra	Potatoes				+ 15		
	Dry Onions						+1,566
	Cucumbers					- 56	
	Grapes				+ 1		
	Olives				+ 18	+ 16	
	Plums	+ 1	+ 4				
Sweida	Tomatoes	+ 67					
	Grapes		+2,628				
	Olives	+ 41					
	Apples	+ 297					
	Peaches	+ 2					
Shahba	Olives	+ 44					
	Plums	+ 12					
Salkhad	Olives	+ 18					
Qunitra	Apples	+ 3					

Continued

Table 8. Continued

Montika	Crop	Nonirrigated Area	Nonirrigated Production	Nonirrigated Yield	Irrigated Area	Irrigated Production	Irrigated Yield
Homs	Rambling Vetch	+ 674					
	Bitter Vetch	+ 513					
	Flowering Sern				- 7		
	Cabbage				+ 45	+1,232	
	Cotton				- 279		
	Potatoes				+ 70		
	Sesame				- 3		- 55
	Grapes	+ 567					
Talkalakh	Flowering Sern	+ 249	+ 210				
	Tomatoes				+ 107	+2,122	
	Haricot Beans				+ 20		
	Olives	+ 267					
	Apples				+ 15		
	Plums				+ 8		
	Pomegranates				+ 5		
Mokhram	Broad Beans	+ 3					
	Grapes	+ 349			+ 1		
Rastan	Cabbage				+ 2	+ 51	
	Cauliflower				+ 3	+ 81	
	Haricot Beans						+ 648
	Dry Haricot Beans					+ 163	
	Squash					+ 157	+1,271
Tadmar	Apricots				+ 1		
	Apples					+ 1	
	Pomegranates				+ 3	+ 13	
	Figs					+ 5	

Continued

Table 8. Continued

Montika	Crop	Nonirrigated Area	Nonirrigated Production	Nonirrigated Yield	Irrigated Area	Irrigated Production	Irrigated Yield
Qasir	Potatoes				+ 178		
	Maize				+ 160	+ 227	
	Grapes				+ 42		
	Olives	+ 7					
Hama	Barley					+ 95	
	Lentils		+ 800	+ 137			
	Watermelon						+4,389
	Eggplant						+4,237
	Dry Haricot Beans				+ 56	+ 97	
	Apples				- 11		
	Green Plums				+ 24	+ 185	
	Peaches				+ 9		
	Figs	+ 24					
Salamiya	Cotton				- 762	-1,092	
	Pumpkins				- 3		
	Sesame				- 2	- 2	
	Grapes	+ 27		+ 1			
Masiaf	Sugar Beets	+ 17					
	Apples	+ 8					
	Plums	+ 3					
	Pomegranates				+ 14		
	Peaches	+ 1					
Ghab	Grapes	+ 87	+ 187			+ 8	
	Olives		+ 43				
	Apricots	+ 2					
	Apples				+ 3		
	Pomegranates				+ 7		
	Peaches				+ 6		

Continued

Table 8. Continued

Mantika	Crop	Nonirrigated Area	Nonirrigated Production	Nonirrigated Yield	Irrigated Area	Irrigated Production	Irrigated Yield
Tartous	Chickpeas	+ 102					
	Watermelon	- 150					
	Dry Onions				- 32		
	Dry Haricot Beans	- 2					
	Grapes	+ 91					
	Olives	+1,373					
	Apricots	+ 8			+ 2		
	Apples	+ 46			+ 4		
	Plums	+ 8	+ 12				
	Green Plums	+ 1					
	Pomegranates				+ 7		
	Peaches	+ 4	+ 6				
Banias	Total Wheat	+ 585					
	Chickpeas	+ 50	+ 42				
	Tomatoes	+ 48			+ 83	+2,862	+1,902
	Eggplant					+ 299	+2,109
	Haricot Beans				+ 12		
	Dry Haricot Beans			+ 107			
	Cucumbers						+1,754
	Squash				+ 39	+ 932	
	Grapes	+ 41					
	Olives	+ 442					
	Apricots	+ 13			+ 1		
	Apples	+ 36			+ 1		+ 5
	Plums					+ 11	
	Green Plums	+ 1				+ 3	

Continued

Table 8. Continued

Montika	Crop	Nonirrigated Area	Nonirrigated Production	Nonirrigated Yield	Irrigated Area	Irrigated Production	Irrigated Yield
Safita	Watermelon	- 123					
	Maize						+ 325
	Millet	- 174					
	Dry Haricot Beans		+ 4				
	Grapes				+ 5		
	Olives				- 2		
	Apricots	+ 1			+ 4		
	Apples	+ 4			+ 32		
	Plums				+ 14		
	Pomegranates	+ 1			+ 7		
	Figs	+ 10					
Lattakia	Maize					+ 2	
	Pumpkins			+2,158			
	Dry Haricot Beans	- 3					
	Figs	- 210	-1,008				
Hafa	Cauliflower					- 4	
	Watermelon		- 29				
	Dry Onions	+ 14					
	Muskmelon		- 19				
	Eggplant						-2,040
	Squash		- 131				
	Apples	+ 103					
	Plums	+ 26			+ 3		
	Pomegranates	+ 4	+ 76				
	Figs	- 83					
Jableh	Okra			+ 410			
	Olives	+ 247					
	Apricots	+ 10			+ 3		
	Apples	+ 27			+ 3		
	Plums				+ 3		
	Peaches				+ 3		
	Figs	- 84	- 485				

Continued

Table 8. Continued

Montika	Crop	Nonirrigated Area	Nonirrigated Production	Nonirrigated Yield	Irrigated Area	Irrigated Production	Irrigated Yield
Idleb	Muskmelon	+ 266					
	Cucumbers	+ 51					
	Olives	+ 912					
	Pomegranates				+ 1	+ 1	+ 1
	Figs	- 283					
Harem	Cauliflower				+ 1		
	Tobacco	+ 179			+ 7		
	Eggplant	- 19					
	Apricots				- 27		
Jisr	Tobacco	+ 123					
	Apples	+ 313					
	Plums	+ 37				+ 20	
	Peaches	+ 8					
	Figs	+ 185					
Ma'ra	Cucumbers				- 2		
Ariha	Total Wheat						+ 300
	Tobacco	+ 75					
	Grapes	+ 96					
A'zaz	Total Wheat				+ 318	+ 900	
	Broad Beans	- 6					
	Watermelon			+ 995			
	Squash					+ 71	
A'farin	Total Wheat				+ 303	+ 775	
	Tobacco				+ 8	+ 13	
	Dry Onions					+ 128	
	Apricots				+ 10		
	Plums				+ 1		
	Green Plums				+ 3		

Continued

Table 8. Continued

Montika	Crop	Nonirrigated Area	Nonirrigated Production	Nonirrigated Yield	Irrigated Area	Irrigated Production	Irrigated Yield
Bab	Total Wheat					+ 894	
	Watermelon				- 1		
	Dry Onions					+1,841	
Manbaj	Cotton				- 908	-1,062	
	Tomatoes					+ 729	+2,960
	Dry Onions						+2,324
	Eggplant						+2,266
	Cucumbers						+1,578
	Olives		+ 4				
	Apricots				+ 12		
	Green Plums				+ 6		
	Pomegranates				+ 8		
Jarablos	Total Wheat				+ 164		
	Cabbage					- 1	- 470
	Cotton				- 168		+ 285
	Figs	- 2					
A'in el A'rb	Total Wheat				+ 794		
	Cotton					+1,545	
	Grapes	+ 5					
Jabl Sam'an	Total Wheat				+1,387		
	Potatoes				+ 11	+ 193	+4,290
Hasakeh	Total Wheat				+2,324		
	Cotton					+2,218	+ 138
	Apples				+ 7		

Continued

Table 8. Continued

Montika	Crop	Nonirrigated Area	Nonirrigated Production	Nonirrigated Yield	Irrigated Area	Irrigated Production	Irrigated Yield
Qamishli	Total Wheat				+1,440		
	Cotton				+ 412		
	Apples				+ 1		
	Pomegranates				+ 1		
	Figs		+ 1				
Mal Kai	Cucumbers				+ 6		
	Grapes	+ 6					
Ras el A'in	Total Wheat				+ 763	+1,762	
	Cotton				+ 614	+1,901	+ 92
Raqa	Cotton				-3,976		+ 139
Tel Abiad	Lentils						+ 232
	Cotton				+ 569	+ 904	
Dier el Zor	Tomatoes				+ 54		
	Muskmelon						+ 950
	Eggplant					+ 267	
	Cucumbers						+1,423
	Squash					+ 183	+ 497
	Grapes					+ 60	
	Olives					+ 2	
	Apricots				+ 53	+ 166	+ 1
	Apples				+ 20	+ 145	
	Green Plums				+ 16	+ 71	
	Pomegranates				+ 4	+ 44	
	Peaches				+ 2	+ 5	
	Figs					+ 28	

Continued

Table 8. Continued

Montika	Crop	Nonirrigated Area	Nonirrigated Production	Nonirrigated Yield	Irrigated Area	Irrigated Production	Irrigated Yield
Maiadin	Muskmelon						+ 734
	Squash						+ 827
	Grapes					+ 7	
	Olives					+ 1	
	Apricots				+ 13	+ 26	
	Apples				+ 8	+ 20	
	Green Plums				+ 4	+ 13	
	Pomegranates					+ 11	
	Figs					+ 19	
Bokamal	Tomatoes				+ 29	+ 609	
	Maize				+ 81		
	Muskmelon						+1,110
	Pumpkins						+1,298
	Cucumbers						+1,654
	Squash						+ 801
	Grapes					+ 8	
	Apricots				+ 12	+ 28	
	Apples				+ 6	+ 21	
	Plums					+ 7	
	Green Plums				+ 3	+ 8	
	Figs					+ 33	

C. Livestock Trends

Analyses of national and Mohafaza trends are presented in this section for the major kinds of livestock in Syria. The data were summarized for the years 1968-1977, and linear regression techniques were used to estimate trends for each kind of livestock and for the total number of animal units. See Appendix 2 for details on analytical procedures used.

Trends are considered adequate for planning purposes if they have high coefficients of determination (R^2) and significant slope values (b), and those satisfying these requirement have been identified.

In addition, feed requirements were estimated at the national level for all livestock in terms of total digestible nutrients (TDN) for each kind and class. These estimates were then compared with the available TDNs of feed supply, including grains, straw, stubble, and range.

National and Regional Trends

Sheep

The trends for sheep have some data problems because statistics prior to 1972 were adjusted in subsequent years. Regional data were not adjusted. A good national linear trend equation is not apparent from using 1968-1977 data. Two reasons are apparent from the study by Boykin and Khoury (see Volume 2, Chapter III): 1) Sheep numbers (and probably other livestock species extensively grazed) are influenced by range quality, which is closely related to rainfall. This partly explains the low livestock numbers in some years. In more recent dry years (i.e. 1977), the rainfall effect has been reduced by supplemental feeding programs. 2) Extensive migration patterns are readily apparent for sheep both within the Steepe and to-and-from the Steppe. This migration crosses political boundaries which may make accounting for all animals difficult.

Using the 1972-1977 data, a relatively good national trend equation results: $y = 428.14t + 4279.7$

b is significant

$R^2 = .80$

$t = 1$ for 1972

Generally, total sheep numbers have been increasing since 1972.

At the regional level, simple trend analysis provided adequate equations for the 1968-1977 period only in the regions of Quneitra, Homs, and Hama. This is probably due to the migratory nature of sheep production which crosses mohafaza boundaries. Most of the increase in sheep numbers since 1972 has apparently been in Homs and Hama, which were 82,100 and 98,420 head per year respectively (b coefficient times 1,000).

Goats

The national total goat numbers declined from 1968 to 1973, then constantly increased through 1977. This nonlinear trend is made up of two linear trends. The 1972-1977 trend is:

Table 9. Regional and National Trend Estimates for Sheep

	Regions	Years										Statistical Results				
		1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	b	a	$\bar{y}$	S^2	R^2
						(000 head)										
02	Damascus	312	344	340	282	406	268	266	295	351	363	.59	319.5	322.7	28.5	.000
03	Dar'a	159	158	198	192	150	118	125	124	173	188	-1.44	166.4	158.5	11.5	.020
04	Sweida	156	147	154	128	120	94	98	106	106	135	-5.04*	152.1	124.4	4.1	.430
05	Qunitra	-	-	-	-	25	24	9	29	29	30	3.90*	-6.9	14.6	.7	.730
06	Homs	312	611	472	522	735	702	949	945	1,035	1,086	82.10*	285.3	736.9	86.2	.910
07	Hama	67 iii/	682	650	662	524	788	864	997	1,069	1,281	98.42*	217.1	758.4	301.8	.800
09	Tartous	-	31	33	30	29	32	30	45	29	30	1.93	18.3	28.9	1.2	.270
10	Lattakia	68	34	54	32	26	24	29	28	26	26	-3.48*	53.9	34.7	1.4	.530
11	Idleb	326	352	450	409	425	387	414	394	384	414	4.32	371.7	395.5	15.3	.130
12	Aleppo	1,338	1,347	1,497	1,498	1,285	1,005	954	976	1,114	1,228	-43.26*	1,462.1	1,224.2	335.7	.410
13	Hasakeh	652	688	748	477	555	608	740	896	914	898	32.59*	538.3	717.6	179.2	.430
14	Raqa	943	965	958	653	473	440	440	547	645	771	-39.48	900.7	683.5	431.7	.310
15	Dier-El-Zor	514	604	558	345	413	350	377	427	615	620	2.48	468.7	482.3	171.1	.000
	National	5,938	6,096	6,046	5,456	5,166	4,840	5,294	5,809	6,490	7,070					
											i/	66.36	5,455.5	5,820.0	5,434.4	.090
											ii/	428.14*	4,279.7	5,778.3	6,542.2	.800

i/ 1968 = 1

ii/ 1972 = 1

iii/ If this observation is eliminated, a much better equation results.

Table 10. Regional and National Trend Estimates for Goats

	Regions	Years										Statistical Results				
		1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	b	a	$\bar{y}$	S^2	R^2
						(000 head)										
02	Damascus	162	166	164	159	159	121	125	146	165	204	.85	152.4	157.1	7.30	.01
03	Dar'a	54	68	75	76	66	54	56	55	89	80	1.27	60.3	67.3	1.90	.09
04	Sweida	88	86	91	77	71	55	59	62	77	88	-1.68	84.7	75.4	2.00	.15
05	Qunitra	-	-	-	-	8	7	1	10	10	9	1.23*	-2.3	4.5	.10	.65
06	Homs	28	30	24	23	30	28	37	39	55	50	2.96*	18.1	34.4	.50	.68
07	Hama	26	27	23	25	28	42	50	52	69	71	5.65*	10.2	41.3	.63	.86
09	Tartous	-	8	11	13	16	25	28	33	33	34	3.91*	-1.4	20.1	.10	.96
10	Lattakia	9	4	7	9	14	17	30	43	34	25	3.64*	- .8	19.2	.70	.70
11	Idleb	50	53	56	58	83	61	79	55	81	92	3.70*	46.5	66.8	1.45	.54
12	Aleppo	129	139	141	144	104	88	105	172	166	172	3.62	116.1	136.0	10.40	.14
13	Hasakeh	77	84	91	65	62	55	49	65	73	90	-.88	75.9	71.1	2.70	.03
14	Raqa	58	57	45	28	29	30	32	42	55	52	-.42	45.1	42.8	2.00	.01
15	Dier-El-Zor	98	48	43	24	27	25	33	40	49	43	-2.90	58.9	43.0	5.22	.17
	National	779	770	774	741	697	608	684	814	956	1,010					
											i/	20.13	672.6	783.3	149.80	.25
											ii/	78.26*	520.9	794.8	317.50	.83

i/ 1968 = 1.
ii/ 1972 = 1

$y = 78.26t + 520.9$
b is significant
$R^2 = .83$
$t = 1$ for 1972

The discussion above on the migratory nature of sheep production probably applies equally well to goats.

At the regional level adequate trends exist only in Homs, Hama, Tartous, and Lattakia for the 1968-1977 period. The trends are up for these regions (2,960; 5,650; 3,910; and 3,640 head per year respectively).

Cows

Generally cow numbers have been increasing in Syria. The national estimated simple trend is:

$y = 15.16t + 242.2$
b is significant
$R^2 = .87$
$t = 1$ for 1968

Regional trends are only apparent in Damascus, Quneitra, Homs, Tartous, and Deir-ez-Zor. This may be the result of migration between regions for grazing purposes. All these regions had increasing trends (5,110; 800; 4,110; 4,720; and 2,590 head per year respectively).

Calves

National calf numbers show no trend between 1968 and 1975 and ranged between 139,000 head in 1971 and 150,000 head in 1969. From 1976 to 1977 numbers increased significantly from 159,000 to 185,000 head.

The 1968 to 1977 trend equation is:

$y = 2.81t + 133.7$
b is not significant
$R^2 = .38$ (relatively low)
$t = 1$ for 1968

The 1972 to 1977 equation is better, reflecting the 1976 to 1977 upswing.

The equation is:

$y = 7.43t + 126.7$
b is significant
$R^2 = .66$
$t = 1$ for 1972

Table 11. Regional and National Trend Estimates for Cows

	Regions	Years										Statistical Results				
		1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	b	a	$\bar{y}$	S^2	R^2
						(000 head)										
02	Damascus	19	20	28	30	42	37	39	48	60	68	5.110*	11.0	39.1	.28	.92
03	Dar'a	40	46	50	42	21	22	31	31	28	31	-2.020	45.3	34.2	.81	.39
04	Sweida	5	5	6	6	9	8	15	13	4	13	.760	4.2	8.4	.14	.34
05	Qunitra	-	-	-	-	5	5	5	6	6	5	.800*	-1.2	3.2	.03	.76
06	Homs	28	29	31	31	38	43	50	52	57	63	4.110*	19.6	42.2	.09	.96
07	Hama	33	28	41	37	33	39	36	45	43	49	1.650*	29.3	38.4	.20	.63
09	Tartous	-	33	32	38	31	36	62	50	51	54	4.720*	12.7	38.7	1.30	.68
10	Lattakia	65	32	33	32	28	28	38	40	36	39	-.930	42.2	37.1	1.45	.07
11	Idleb	20	22	19	22	19	16	26	16	15	19	-.390	21.5	19.4	.13	.12
12	Aleppo	27	28	28	28	28	28	27	30	13	14	-1.300	32.3	25.1	.31	.41
13	Hasakeh	23	22	23	17	19	19	36	22	37	29	1.280	17.7	24.7	.47	.31
14	Raqa	3	2	3	4	4	4	3	4	2	1	-.100	3.5	3.0	.01	.08
15	Dier-El-Zor	10	10	11	10	16	19	24	22	31	30	2.590*	4.1	18.3	.09	.91
	National	273	277	305	297	293	304	336	370	382	419					
											i/	15.600*	242.2	325.6	4.42	.87

i/ 1968 = 1

Table 12. Regional and National Trend Estimates for Calves

	Regions	Years										Statistical Results				
		1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	b	a	$\bar{y}$	S^2	R^2
						(000 head)										
02	Damascus	9	8	13	13	26	21	22	25	30	41	3.180*	3.33	20.8	.20	.86
03	Dar'a	15	16	17	15	8	8	9	9	11	9	-.890*	16.60	11.7	.08	.55
04	Sweida	3	3	3	3	5	4	4	3	4	4	.110	3.10	3.6	.01	.22
05	Qunitra	-	-	-	-	3	5	3	1	3	5	.500*	-.73	2.0	.03	.54
06	Homs	15	16	16	17	21	18	21	22	20	24	.900*	14.07	19.0	.02	.81
07	Hama	27	27	23	15	12	11	10	9	13	12	-1.930*	26.53	15.9	.20	.70
09	Tartous	-	16	17	20	15	19	19	23	23	28	2.010*	6.93	18.0	.24	.68
10	Lattakia	33	17	18	18	13	14	18	19	16	17	-.880	23.13	18.3	.32	.23
11	Idleb	10	12	9	11	12	9	9	7	11	13	.010	10.27	10.3	.05	.00
12	Aleppo	18	19	12	12	12	17	9	10	7	7	-1.190*	18.87	12.3	.08	.68
13	Hasakeh	7	12	13	10	10	11	9	9	12	13	.190	9.53	10.6	.05	.09
14	Raqa	1	1	1	2	1	2	1	1	1	0	-.070	1.47	1.1	.00	.13
15	Dier-El-Zor	3	3	3	3	3	7	6	6	8	11	.820*	.80	5.3	.02	.79
	National	141	150	145	139	142	145	141	144	159	185					
											i/	2.810	133.7	149.1	1.64	.38
											ii/	7.430*	126.7	152.7	7.19	.66

i/ 1968 = 1

ii/ 1972 = 1

The national trends are fairly weak, suggesting that time may not be an adequate independent variable.

Damascus has had the greatest growth in calf numbers and has a good linear trend equation (3,180 head per year). Homs, Tartous, and Deir-ez-Zor have increasing numbers (900; 2,010; and 820 head per year respectively), shown by fairly good linear trends. Hama and Aleppo have fairly significant linear downward trends in calf numbers (-1,930 and -1,190 head per year respectively).

Horses and Mules

Horses and mules are reported separately in the livestock statistics. Nationally, the number of horses and mules has been decreasing since 1968. The following national trend was found for 1968 to 1977:

$y = -3.9t + 139.13$
b is significant
$R^2 = .87$
$t = 1$ for 1968

Damascus is the only Mohafaza to have a good equation showing increasing numbers of horses and mules (650 head per year). Dar'a, Al-Hasakeh and Deir-ez-Zor have significant downward trends (-1,900 head, -1,410 and -1,400 head per year respectively).

Asses

The national linear trend for 1968-1977 does not have a good fit. The total number of asses was 235,000 in both 1968 and 1977 and peaked in 1973 at 248,000. The 1968 to 1977 linear national trend has a slope of -.47 but a low R^2 of .07. The 1972 to 1977 trend equation is better with a slope of -.25 and an R^2 of .57 but this is low. Again, time may not be an adequate independent variable.

The 1972 to 1977 equation is:

$y = -2.49t + 247.5$
b is significant
R^2 is low at .57
$t = 1$ for 1972

The strongest upward regional trend is in Damascus (1,420 head per year). Hama has an upward trend also (680 head per year). Downward trends are apparent in Dar'a, Al-Hasakeh, and Al-Rakka (-2,350; -1,820; and -2,250 head per year respectively). (The estimates for Dar'a Mohafaza do not fall within the criteria specified for acceptance, but the magnitude of change is large; thus the regional trend is discussed.)

Table 13. Regional and National Trend Estimates for Horses and Mules

	Regions	Years										Statistical Results				
		1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	b	a	$\bar{y}$	S^2	R^2
						(000 head)										
02	Damascus	6	6	7	8	9	8	8	9	11	13	.650*	4.93	8.5	.01	.82
03	Dar'a	16	18	18	19	6	6	6	4	5	4	-1.870*	20.47	10.2	.15	.74
04	Sweida	4	4	4	4	4	3	4	3	3	3	-.130	4.33	3.6	.00	.61
05	Qunitra	-	-	-	-	0	1	0	0	0	0	.010	.07	.1	.00	.00
06	Homs	13	16	15	15	13	15	18	19	12	12	-.040	15.00	14.8	.10	.00
07	Hama	15	14	14	14	15	14	14	12	13	11	-.333*	15.40	13.6	.01	.61
09	Tartous	-	0	0	1	1	1	1	1	0	1	.130	.00	.7	.00	.64
10	Lattakia	3	2	2	2	1	1	1	1	1	1	-.200	2.60	1.5	.00	.73
11	Idleb	21	22	26	26	29	27	19	18	17	19	-.700	26.30	22.4	.19	.25
12	Aleppo	21	21	21	17	14	25	21	24	28	25	.910	17.0	22.0	.17	.38
13	Hasakeh	16	16	16	12	11	10	10	6	5	5	-1.410*	18.47	10.7	.01	.94
14	Raqa	7	5	5	5	5	5	5	5	3	6	-1.400*	5.87	5.1	.01	.18
15	Dier-El-Zor	7	6	5	5	2	2	2	2	2	3	-.530*	6.53	3.6	.02	.68
	National	128	130	133	131	119	119	110	104	100	103					
											i/	-3.900*	139.13	117.7	.30	.87

i/ 1968 = 1

Table 14. Regional and National Trend Estimates for Asses

	Regions	Years										Statistical Results				
		1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	b	a	$\bar{y}$	S^2	R^2
						(000 head)										
02	Damascus	13	12	16	19	23	21	22	23	24	25	1.42*	12.00	19.8	.04	.86
03	Dar'a	21	23	24	33	14	15	12	4	5	10	-2.35*	29.00	16.1	.45	.61
04	Sweida	9	9	9	10	10	10	11	10	10	10	.15	9.00	9.8	.00	.48
05	Qunitra	-	-	-	-	2	2	1	2	0	1	.13	.07	.8	.01	.19
06	Homs	20	20	18	18	18	24	25	24	20	19	.29	19.00	20.6	.09	.11
07	Hama	14	15	14	16	16	16	18	18	21	19	.68*	12.90	17.8	.01	.84
09	Tartous	-	14	16	18	20	26	27	22	25	22	2.05*	7.73	19.0	.33	.61
10	Lattakia	30	17	17	18	18	20	24	24	21	22	.07	20.70	21.1	.23	.00
11	Idleb	20	21	22	20	24	23	18	18	15	16	-.64*	23.20	19.7	.07	.43
12	Aleppo	33	31	28	27	28	28	32	39	38	32	.67	27.90	31.6	.18	.23
13	Hasakeh	19	20	20	18	29	17	5	6	7	8	-1.82*	23.90	13.9	.16	.73
14	Raqa	34	42	32	30	30	23	20	22	22	18	-2.25*	39.70	27.3	.14	.81
15	Dier-El-Zor	22	19	19	17	21	23	28	20	26	34	1.19*	16.30	22.9	.18	.50
	National	235	243	235	244	242	248	242	232	234	235					
											i/	- .47	241.60	239.0	.37	.07
											ii/	-2.49*	247.50	238.8	1.15	.57

i/ 1968 = 1
ii/ 1972 = 1

Camels

The national trend is decreasing numbers of camels. Following is a 1968 to 1977 trend equation which, compared to national trend equations for other livestock classes, has a low R^2 coefficient:

$y = -5.57t + 117.73$
b is significant
$R^2 = .62$
$t = 1$ for 1968

The R^2 on the national trend is fairly low, but the b coefficient shows a significant downward trend nationally.

At the regional level no good linear time trends are apparent.

Oxen

Nationally, the trend in total oxen numbers has been down during the 1968 to 1977 period. The simple linear trend equation for 1968 to 1977 is:

$y = -6.5t + 87.3$
b is significant
$R^2 = .93$
$t = 1$ for 1968

No regions show increasing trends for oxen. Significant downward trends are apparent in Dar'a (-810 head per year); Al-Sweida (-250 head per year); Aleppo (-1,100 head per year); and Al-Hasakeh (-820 head per year).

Animal Units

Using the animal unit (AU) as a common denominator to aggregate different livestock classes, total national and regional livestock trends were estimated for Syria.1/

Nationally, the 1972-1977 trend equation is better than the 1968-1977 equation. The 1972-1977 equation is:

$y = 112.13t + 1,679.8$
b is significant
$R^2 = .71$
$t = 1$ for 1972

Only Homs and Hama have good linear trends for the 1968-1977 period. The trends in both regions are upward in total animal units (21,530 and 21,330 animal units per year respectively).

1/ An animal unit (AU) is a common denominator used to aggregate different classes of livestock. Assumed animal unit coefficients are: 5 sheep = 1 AU; 1 1,000 lb cow and calf = 1 AU; 1 horse or mule = 1 AU; and 1 ass = ½ AU. Other classes (calves and camels) are broken down by size: 1,000 lb. animal = 1 AU; 500 lb. animal = ½ AU; etc.

Table 15. Regional and National Trend Estimates for Camels

	Regions	Years										Statistical Results				
		1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	b	a	$\bar{y}$	S^2	R^2
						(00 head)										
02	Damascus	9	13	11	12	15	8	12	28	28	27	2.09*	4.80	16.30	.34	.61
03	Dar'a	3	5	1	3	3	2	2	2	2	2	-.18	3.47	2.50	.01	.24
04	Sweida	4	5	4	4	2	1	1	2	2	8	-.03	3.47	3.30	.06	.00
05	Qunitra	-	-	-	-	1	.1	0	0	0	-	.00	.20	.20	.00	.00
06	Homs	2	7	3	4	44	9	18	29	31	29	3.02*	.00	16.60	1.63	.41
07	Hama	1	1	1	0	3	3	1	1	-	-	-.08	1.53	1.10	.02	.05
09	Tartous	-	1	1	1	1	1	1	1	1	-	.00	.80	.80	.00	.00
10	Lattakia	3	1	1	1	1	1	1	0	1	1	-.13	1.80	1.10	.01	.27
11	Idleb	1	1	1	0	0	0	0	0	0	-	-.13	1.00	.30	.00	.64
12	Aleppo	9	7	8	11	3	3	1	1	0	3	-1.02*	10.20	4.60	.07	.65
13	Hasakeh	1	0	-	-	7	7	5	8	7	7	.96*	-1.07	4.20	.05	.69
14	Raqa	30	4	5	0	1	2	2	-	0	-	-1.92*	14.93	4.40	.69	.40
15	Dier-El-Zor	1	15	3	50	10	20	32	0	1	5	-.73	17.73	13.70	3.58	.02
	National	122	118	97	91	58	76	62	62	73	83					
											i/	-5.57*	117.73	87.10	2.37	.62

i/ 1968 = 1

Note: Different data source; The Annual Agricultural Statistical Abstract 1973, by the Syrian Arab Republic Ministry of Agriculture and Agrarian Reform.

Table 16.Regional and National Trend Estimates for Oxen

	Regions	Years										Statistical Results				
		1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	b	a	$\bar{y}$	S^2	R^2
						(000 head)										
02	Damascus	4	4	3	3	3	3	3	3	3	4	-.04	3.50	3.3	.43	.07
03	Dar'a	7	7	5	4	1	1	0	0	1	1	-.81*	7.10	2.7	.02	.76
04	Sweida	3	3	3	3	3	2	2	2	1	1	-.25*	3.70	2.3	.00	.84
05	Qunitra	-	-	-	-	3	0	0	0	0	0	-.02	.40	.3	.01	.00
06	Homs	10	11	10	10	9	5	6	6	9	8	-.41	10.70	8.4	.04	.36
07	Hama	1	1	2	2	2	1	2	1	1	1	-.04	1.60	1.4	.00	.05
09	Tartous	-	16	15	16	10	11	12	10	10	11	.13	10.40	11.1	.29	.01
10	Lattakia	34	17	16	14	7	8	11	11	6	7	-2.14*	24.90	13.1	.37	.61
11	Idleb	8	9	7	3	2	1	1	4	1	2	-.80*	8.20	3.8	.05	.62
12	Aleppo	10	10	10	10	9	8	8	4	1	1	-1.10*	13.10	7.1	.04	.81
13	Hasakeh	7	7	7	4	4	4	1	1	1	1	-.82*	8.20	3.7	.01	.89
14	Raqa	0	0	1	1	0	0	0	0	0	0	-.05	.50	.2	.00	.12
15	Dier-El-Zor	1	1	1	1	0	0	0	1	1	1	-.02	.80	.7	.00	.01
	National	85	86	80	71	52	45	48	43	34	35					
											i/	-6.50*	93.90	58.0	.43	.93

i/ 1968 = 1

Table 17. Regional and National Trend Estimates for Animal Units (99)

Regions	Years										Statistical Results				
	1968	1969	1970	1971	1972 (000	1973 head)	1974	1975	1976	1977	b	a	$\bar{y}$	S^2	R^2
02 Damascus	140.6	148.6	158.5	120.9	197.5	151.4	155.6	162.6	197.6	216.0	6.64*	128.67	165.2	6.40	.46
03 Dar'a	131.2	143.7	153.3	147.2	83.8	76.3	84.1	77.7	95.8	100.5	- 7.14*	148.67	109.4	6.69	.49
04 Sweida	70.6	68.6	71.8	64.3	65.1	52.0	62.1	60.5	53.0	71.2	- 1.13	70.20	64.0	.55	.22
05 Qunitra	-	-	-	-	20.3	15.9	9.0	15.3	14.4	14.8	2.01*	-2.13	8.9	.39	.56
06 Homs	146.9	214.6	182.8	193.3	250.3	236.8	303.8	308.6	331.2	345.5	21.53*	133.07	251.5	5.51	.91
07 Hama	89.3	207.0	212.3	206.1	180.6	238.7	251.0	282.5	300.8	346,1	21.33*	114.20	231.5	12.11	.82
09 Tartous	-	88.0	87.5	98.8	76.7	93.1	121.8	109.3	107.6	114.8	8.27*	44.40	89.9	7.66	.53
10 Lattakia	183.5	92.8	96.9	88.4	66.7	70.4	94.0	98.7	79.7	83.9	- 5.82	127.60	95.6	10.54	.29
11 Idleb	147.4	159.7	175.9	162.9	171.6	150.6	159.1	144.3	140.0	157.7	- 1.42	164.80	157.0	1.61	.13
12 Aleppo	388.7	392.6	418.2	415.1	358.4	310.7	296.5	316.3	321.5	341.1	-11.15*	417.33	356.0	12.14	.56
13 Hasakeh	212.0	222.4	237.3	159.4	182.3	185.0	213.8	231.3	252.3	245.5	3.96	192.20	214.0	10.53	.16
14 Raqa	235.7	235.7	228.1	163.2	125.1	115.9	113.3	140.3	158.5	182.6	- 9.79	223.73	169.9	20.61	.37
15 Dier-El-Zor	154.1	162.4	149.8	110.8	120.0	115.0	131.4	132.4	185.0	191.1	2.78	129.8	145.1	9.88	.09
National	1900.	2136.1	2272.4	1930.4	1898.4	1811.8	1995.5	2079.8	2237.4	2410.8					
										i	27.02	1918.6	2067.2	423.11	.18
										ii	112.13*	1679.8	2027.3	56.18	.71

i/ 1968 = 1

i/ 1972 = 1

Feed Requirements and Supply

Boykin and Khoury estimated the total annual production of livestock feed sources including crops, residuals, pasture, and range on a dry matter basis. They then estimated the total available TDN for 1977 as 2,064,900 tons, see Appendix 3. Estimated livestock and livestock TDN requirements by region for 1975, 1976 and 1977 were calculated as shown in Table 18, 19, and 20.

For 1977, the estimated national requirements for all livestock classes was 4,791,300 tons of TDN. The result is a net estimated national TDN deficit of 2,726,400 tons for 1977. This is equivalent to importing 3,495,400 tons of barley 1/ (from Appendix 3).

National TDN requirements grew from 4,180,000 tons in 1975 to 4,791,300 tons in 1977. Regional supply estimates were not calculated.

1/ $(2{,}726{,}400 \text{ mt TDN}) \dfrac{\text{1mt Barley}}{(.78 \text{ mt TDN})}$

Table 18. Regional and National TDN Requirements for the Syrian Arab Republic, 1975.

Regions	Sheep	Goats	Cows	Calves	Horses & Mules	Asses	Camels	Oxen	Milk Production	TDN Required
	(000 head)								(000 mt.)	(000 mt.)
02 Damascus	295	146	48	25	9	23	2.8	3	95.0	377.0
03 Dar'a	124	55	31	9	4	4	0.2	0	32.0	161.9
04 Sweida	106	62	13	3	3	10	0.2	2	19.0	122.9
05 Qunitra	29	10	6	1	0	2	0.0	0	5.0	31.9
06 Homs	945	39	52	22	19	24	1.9	6	85.0	606.2
07 Hama	997	52	45	9	12	18	0.1	1	48.0	557.9
09 Tartous	45	33	50	23	1	22	0.1	10	36.0	215.9
10 Lattakia	28	43	40	19	1	24	0.0	11	21.0	189.8
11 Idleb	394	55	16	7	18	18	0.0	4	23.0	288.1
12 Alleppo	976	172	30	10	24	39	0.1	4	79.0	640.5
13 Hasakeh	896	65	22	9	6	6	0.8	1	63.0	453.7
14 Raqa	547	42	4	1	5	22	0.0	0	25.0	279.1
15 Dier-El-Zor	427	40	22	6	2	20	0.0	1	36.0	270.0
National	5,809	814	370	144	104	232	6.2	43	567.0	4,180.0

Table 19. Regional and National TDN Requirements for the Syrian Arab Republic, 1976.

Regions	Sheep	Goats	Cows	Calves	Horses & Mules	Asses	Camels	Oxen	Milk Production	TDN Required
	(000 head)								(000 mt.)	(000 mt.)
02 Damascus	351	165	60	30	11	24	2.8	3	133	451.5
03 Dar'a	173	89	28	11	5	5	0.2	1	42	197.4
04 Sweida	106	77	4	4	3	10	0.2	1	15	108.2
05 Qunitra	29	10	6	3	0	0	0.0	0	5	30.7
06 Homs	1,035	55	57	20	12	20	3.1	9	94	645.1
07 Hama	1,069	69	43	13	13	21	0.0	1	67	603.2
09 Tartous	29	33	51	23	0	25	0.1	10	32	207.9
10 Lattakia	26	34	36	16	1	21	0.1	6	23	161.4
11 Idleb	384	81	15	11	17	15	0.0	1	33	286.1
12 Alleppo	1,114	166	13	7	28	38	0.0	1	73	652.5
13 Hasakeh	914	73	37	12	5	7	0.7	1	66	495.9
14 Raqa	645	55	2	1	3	22	0.0	0	33	314.2
15 Dier-El-Zor	615	49	31	8	2	26	0.1	1	49	370.1
National	6,490	956	382	159	100	234	7.3	34	665	4,530.9

Table 20. Regional and National TDN Requirements for the Syrian Arab Republic, 1977.

Regions	Sheep	Goats	Cows	Calves	Horses & Mules	Asses	Camels	Oxen	Milk Production	TDN Required
	(000 head)								(000 mt.)	(000 mt.)
02 Damascus	363	204	68	41	13	25	2.7	4	152	510.3
03 Dar'a	188	80	31	9	4	10	0.2	1	34	206.3
04 Sweida	135	88	13	4	3	10	0.8	20	20	143.4
05 Qunitra	30	9	5	5	0	1	0.0	0	5	32.0
06 Homs	1,086	50	63	24	12	19	2.9	8	97	698.8
07 Hama	1,281	71	49	12	11	19	0.0	1	66	685.5
09 Tartous	30	34	54	28	1	22	0.0	11	34	224.5
10 Lattakia	26	25	39	17	1	22	0.1	7	32	171.4
11 Idleb	414	92	19	13	19	16	0.0	2	33	319.1
12 Alleppo	1,228	172	14	7	25	32	0.3	1	80	685.7
13 Hasakeh	898	90	29	13	5	8	0.7	1	28	470.6
14 Raqa	771	52	1	0	6	18	0.0	0	33	357.7
15 Dier-El-Zor	620	43	30	11	3	34	0.5	1	33	385.9
National	7,070	1,010	419	185	103	235	8.3	35	647	4,791.3

D. Livestock Product Trends

National and mohafaza trends were estimated for livestock and poultry products in Syria using linear regression analysis for the period 1968-1977. See Appendix 4 for details on the analytical procedures used. The products included eggs, chickens, goat hair, washed wool, milk, butter, cheese, and ghee.

Trends are considered adequate for planning purposes if they have high coefficients of determination (R^2) and significant slope balues (b), and those satisfying these requirements have been identified.

National and Regional Trends

Eggs

Significant trend lines with high R^2 were found only for Damascus Mohafaza and the Syrian Arab Republic (National). The estimated trend equations are:

Damascus $\hat{y} = -54 + \underset{(4.84)}{30.65}t$ $R^2 = .83$

National $y = 173 + \underset{(11.13)}{47.99}t$ $R^2 = .74$

Both trend lines indicate increasing egg production over time with Damascus Mohafaza and the National totals increasing by an average of 30.65 million and 47.99 million eggs per year, respectively, over the 1968 to 1977 period.

Chickens

A significant trend line with high R^2 was found only for Damascus Mohafaza for chickens. The estimated trend equation is:

Damascus $\hat{y} = -1065 + \underset{(95)}{573}t$ $R^2 = .82$

The latter equation indicates an average annual increase of 573,000 chickens per year in Damascus Mohafaza from 1968 to 1977.

Note that the National total and Dar'a, Homs, Hama, Tartous, Idleb, Aleppo and Al-Hasakeh Mohafazat each demonstrated positive, significant slope parameters but low R^2.

Table 21. Regional and National Trend Estimates for Eggs

Regions	Years										Statistical Results[2)]				
	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977					
	x 1,000,000										$\bar{y}$	R^2	$\hat{a}$	$\hat{b}$	s
Damascus	30.2	34.6	23.0	22.5	45	78	165	247	249	250	115	.83	-54	30.65*	4.84
Dar'a	3.0	15.0	13.9	22.0	22	27	21	15	22	17	18	.25	12	1.1	.67
Sweida	10.4	13.7	14.1	14.9	13	12	6	9	8	9	11	.40	14	-.63*	.27
Qunitra[1)]	-	-	-	-	2	3	0	1	1	0	1	.47	3	-.43	.23
Homs	56.5	47.0	38.2	44.2	36	41	27	136	127	138	69	.49	11	10.50*	3.77
Hama	16.8	36.5	13.9	19.2	16	35	23	31	43	50	29	.44	13	2.76*	1.09
Tartous	25.9	30.9	31.0	41.5	47	33	31	27	27	18	31	.14	37	-1.01	.89
Lattakia	15.0	17.2	15.9	14.1	16	11	17	14	15	19	15	.02	15	.1	.25
Idleb	20.5	11.7	19.4	9.5	12	11	21	23	26	28	18	.35	11	1.29	.62
Aleppo	84.3	107.6	80.9	87.2	86	86	57	110	133	100	93	.11	81	2.27	2.27
Hasakeh	20.5	16.9	8.4	16.9	18	21	17	19	29	20	19	.22	14	.81	.53
Raqa	18.5	12.8	7.8	2.5	5	6	10	14	8	11	10	.04	12	-.33	.54
Dier-El-Zor	11.5	10.5	7.6	7.4	6	6	10	10	12	12	9	.04	9	.16	.28
National	312.9	354.3	274.1	302	324	370	405	656	700	672	437	.74	173	47.99*	11.13

1) Regression only for the years 1972-1977, inclusive.
2) Rounded to nearest integer value, except R^2, a, and s.

*Estimated slope parameter statistically different from zero at the .05 level of significance using a two-tailed t test and 8 degrees of freedom.

Table 22. Regional and National Trend Estimates for Chickens (total)

Regions	Years										Statistical Results 2)				
	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	$\bar{y}$	R^2	$\hat{a}$	$\hat{b}$	s
	x 1000														
Damascus	375	400	420	1171	1473	1163	1558	4117	5108	5064	2085	.82	-1065	573*	95
Dar'a	43	144	178	276	227	234	363	263	532	1838	410	.48	-242	119*	44
Sweida	144	151	156	164	162	142	113	134	459	168	179	.15	110	13	11
Qunitra 1)	-	-	-	-	26	25	3	11	15	40	20	.04	15	1	3
Homs	565	470	478	594	625	505	750	973	4038	4690	1369	.56	-795	393*	124
Hama	332	251	236	265	260	326	410	430	827	1085	442	.62	33	74*	20
Tartous	385	354	350	455	477	335	439	480	1573	2395	724	.51	-178	164*	57
Lattakia	200	252	250	230	211	145	232	216	540	341	262	.26	160	19	11
Idleb	239	158	170	142	139	161	222	210	678	716	284	.49	4	51*	18
Aleppo	1458	1087	1095	1013	1148	1167	833	1170	3919	4013	1090	.42	268	259*	108
Hasakeh	230	95	98	265	244	202	221	285	552	367	256	.52	83	31*	11
Raqa	124	128	130	100	100	129	120	130	246	99	131	.09	108	4	5
Dier-El-Zor	151	95	108	110	70	80	137	153	189	187	128	.32	85	8	4
National	4247	3586	3669	4785	5162	4614	5401	8572	19676	21003	8072	.64	-1570	1753*	462

1) Regression for the years 1972-1977, inclusive.
2) Rounded to nearest integer value, except R^2

*Estimated slope parameter statistically different from zero at the .05 level of significance using a two-tailed t test and 8 degrees of freedom.

Goat Hair

Significant trend lines with high R^2 for goat hair were found only for Dar'a and Tartous Mohafazat. The estimated trend equations are:

Dar'a $\hat{y} = 109 - \underset{(2.57)}{11.48t}$ $R^2 = .71$

Tartous $\hat{y} = 1 + \underset{(.25)}{2.30t}$ $R^2 = .92$

The estimated equations suggest an average annual decrease of 11.48 metric tons in goat hair production in Dar'a Mohafaza and an increase of 2.30 metric tons in Tartous. Homs, Lattakia and Al-Hasakeh Mohafazat had significant slope parameters but low R^2.

Wool

Significant trend lines with high R^2 for washed wool were not apprent. The best single equation estimated was for Aleppo Mohafaza:

Aleppo $y = 2017 - \underset{(23)}{98t}$ $R^2 = .69$

The estimated equation for Aleppo indicates an average annual decrease in washed wool production of 98 metric tons over the years 1968 to 1977. Dar'a and Al-Rakka also had significant negative slope parameters but low R^2.

Milk

Significant trend lines with high R^2 for milk were computed for Damascus, Homs, Hama and Aleppo Mohafazat. The estimated trend equations are:

Damascus $\hat{y} = 18 + \underset{(2.1)}{10.9t}$ $R^2 = .78$

Homs $\hat{y} = 23 + \underset{(1.5)}{7.0t}$ $R^2 = .72$

Hama $\hat{y} = 16 + \underset{(0.8)}{4.5t}$ $R^2 = .80$

Aleppo $\hat{y} = 131 - \underset{(1.4)}{6.4t}$ $R^2 = .74$

The estimated equations suggest average annual increases of 10.9, 7.0 and 4.5 thousand metric tons of milk for Damascus, Homs and Hama, respectively, for the years 1968-1977. Aleppo's estimate indicates an average annual decrease of 6.4 thousand metric tons of milk for the same time period.

Table 23. Regional and National Trend Estimates for Goat Hair

Regions	Years										Statistical Results 2)				
	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	$\bar{y}$	R^2	$\hat{a}$	$\hat{b}$	s
	Metric tons														
Damascus	31	35	29	37	35	23	29	41	51	45	36	.33	27	1.59	.79
Dar'a	95	107	112	36	28	20	15	14	18	16	46	.71	109	-11.48*	2.57
Sweida	26	26	27	24	21	19	24	23	30	39	26	.17	22	.75	.59
Quintra	-	-	-	-	4	4	1	-	-	5	Insufficient observations				
Homs	12	12	11	11	10	8	9	15	21	16	13	.28	9	.67	.38
Hama 2)	284	15	14	14	5	15	23	25	39	33	20	.64	5	3.12*	.88
Tartous	5	5	5	12	11	17	21	20	22	23	14	.92	1	2.30*	.25
Lattakia	1	2	4	5	6	6	11	16	18	7	8	.62	-1	1.48*	.41
Idleb	34	46	43	47	33	25	29	14	22	38	33	.33	44	-2.05	1.03
Aleppo	72	70	151	205	106	85	81	167	131	158	123	.12	93	5.38	5.11
Hasakeh	115	54	58	101	120	78	48	62	17	20	67	.43	110	-7.85*	3.17
Raqa	29	26	22	12	20	22	19	32	25	37	24	.13	20	.84	.78
Dier-El-Zor	53	55	53	29	39	33	43	52	65	30	45	.03	49	-.64	1.41
National	757	453	529	533	438	355	353	481	459	467	483	.31	597	-21	11

1) $\bar{y}$ and a rounded to nearest integer value
2) Regression only for the years 1969-1977

* Estimated slope parameter statistically different from zero at the .05 level of significance using a two-tailed t test and 8 degrees of freedom.

Table 24. Regional and National Trend Estimates for Wool (Washed)

Regions	Years										Statistical Results[2)]				
	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	$\bar{y}$	R^2	$\hat{a}$	$\hat{b}$	s
	Metric tons														
Damascus	200	220	283	323	370	225	254	309	333	361	288	.37	221	12	6
Dar'a	277	309	334	228	157	127	132	89	171	188	201	.54	312	-20*	7
Sweida	156	147	153	128	120	95	96	108	115	137	126	.37	150	-4	2
Qunitra [1)]	-	-	-	-	25	24	12	37	30	31	27	.21	19	2	2
Homs	534	830	663	565	574	627	1222	1097	798	700	761	.19	579	33	25
Hama	682	647	629	646	522	651	2030	993	1045	1280	913	.32	437	86	44
Tartous	32	49	38	50	32	42	30	46	24	36	38	.10	43	-1	1
Lattakia	31	34	46	39	20	19	36	23	24	27	30	.23	38	-1	1
Idleb	456	441	404	439	432	392	507	403	439	419	433	.01	439	-1	4
Aleppo	1715	1731	1904	1936	1692	1370	1131	972	1109	1225	1479	.69	2017	-98*	23
Hasakeh	879	1860	978	812	675	743	708	895	914	870	933	.16	1179	-45	36
Raqa	942	960	915	660	756	660	390	554	634	785	726	.41	939	-39*	16
Dier-El-Zor	544	723	668	617	696	522	566	644	924	775	668	.21	567	18	13
National	6448	7951	7015	6443	6071	5497	7114	6170	6560	6834		.06	6912	-55	76

1) Regression only for the years 1972-1977, inclusive.
2) Rounded to nearest integer value, except R^2

* Estimated slope parameter statistically different from zero at the .05 level of significance using a two-tailed t test and 8 degrees of freedom.

Table 25. Regional and National Trend Estimates for Milk

Regions	Years										Statistical Results[2)]				
	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	$\bar{y}$	R^2	$\hat{a}$	$\hat{b}$	s
	x 1000 Metric tons														
Damascus	44	51	51	51	76	57	69	95	133	152	78	.78	18	10.9*	2.1
Dar'a	53	61	66	56	23	20	25	32	42	34	41	.39	60	-3.5*	1.5
Sweida	20	17	18	9	18	13	13	19	15	20	16	.00	16	-.1	.4
Qunitra[1)]	-	-	-	-	3	3	1	5	5	5	4	.43	2	.57	.33
Homs	50	47	35	32	44	50	80	85	94	97	61	.72	23	7.0*	1.5
Hama	30	30	27	28	30	42	42	48	67	66	41	.80	16	4.5*	.8
Tartous	27	30	21	23	18	23	31	36	32	34	28	.30	21	1.1	.6
Lattakia	28	29	32	30	19	17	21	21	23	32	25	.09	28	-.6	.6
Idleb	30	24	22	47	37	22	32	23	33	33	30	.01	29	.2	.9
Aleppo	122	128	112	120	94	66	85	79	73	80	96	.74	131	-6.4*	1.4
Hasakeh	93	55	48	31	60	52	51	63	66	28	55	.15	67	-2.3	2.0
Raqa	23	20	12	6	10	11	22	25	33	33	20	.32	10	1.8	.9
Dier-El-Zor	28	32	7	8	26	18	28	36	49	33	27	.27	14	2.2	1.3
National	548	524	451	441	458	394	500	567	665	647	520	.28	434	15.6	8.8

1) Regression over the years 1972-1977, inclusive.
2) $\bar{y}$ and a rounded to nearest integer value.

* Estimated slope parameter statistically different from zero at the .05 level of significance using a two-tailed t test and 8 degrees of freedom.

Butter

Significant trend lines with high R^2 for butter were found only for Aleppo and Al-Hasakeh Mohafazat and the Syrian Arab Republic. The estimated equations are:

Aleppo	$\hat{y} = 619 - \underset{(10)}{55t}$	$R^2 = .80$
Al-Hasakeh	$\hat{y} = 153 - \underset{(3)}{17t}$	$R^2 = .81$
National	$\hat{y} = 2134 - \underset{(22)}{124t}$	$R^2 = .80$

The estimated equations show average annual decreases in butter production of 55, 17 and 124 metric tons for Aleppo Mohafaza, Al-Hasakeh Mohafaza and the Syrian Arab Republic, respectively, for the years 1968-1977. Significant slope parameters but low R^2 were computed for Damascus (-15), Dar'a (-37), Homs (-14), Hama (+8), Lattakia (-12), Idleb (-14) and Deir-ez-Zor (+12).

Cheese

Significant trend lines with high R^2 were not apparent for cheese production. The best estimated equations were:

Damascus	$\hat{y} = 1283 + \underset{(72)}{283t}$	$R^2 = .66$
Hama	$\hat{y} = 922 + \underset{(90)}{345t}$	$R^2 = .65$

Ghee

Significant trend lines with high R^2 were found for Dar'a, Lattakia and Aleppo Mohafazat. The estimated equations are:

Dar'a	$\hat{y} = 952 - \underset{(14)}{61t}$	$R^2 = .70$
Lattakia	$\hat{y} = 255 - \underset{(3)}{20t}$	$R^2 = .84$
Aleppo	$\hat{y} = 2979 - \underset{(27)}{231t}$	$R^2 = .90$

The estimated equations indicate average annual decreases in ghee production of 61, 20 and 231 metric tons for Dar'a, Lattakia and Aleppo Mohafazat, respectively, for the years 1968-1977. Homs and Hama Mohafazat both had computed significant positive slope parameters but low R^2.

Table 26. Regional and National Trend Estimates for Milk Derivatives: Butter

Regions	Years										Statistical Results[1)]				
	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	$\bar{y}$	R^2	$\hat{a}$	$\hat{b}$	s
	Metric tons														
Damascus	55	142	149	143	89	14	20	14	-	6	63	.57	148	-15*	5
Dar'a	287	244	276	445	5	14	152	18	52	-	149	.51	352	-37*	13
Sweida	-	-	-	-	-	-	19	60	85	-	Insufficient observations				
Qunitra	-	-	-	-	10	-	-	-	-	-	Insufficient observations				
Homs	217	179	149	181	114	41	62	144	77	96	126	.52	201	-14*	5
Hama	81	76	95	131	45	115	116	159	164	119	110	.42	67	8*	3
Tartous	162	327	142	218	148	205	213	408	268	356	245	.29	155	16	9
Lattakia	162	191	178	167	197	138	123	107	51	115	143	.63	208	-12*	3
Idleb	181	133	64	220	183	78	83	27	100	22	109	.41	188	-14*	6
Aleppo	542	351	585	426	358	317	348	170	69	22	319	.80	619	-55*	10
Hasakeh	157	75	141	72	77	56	-	14	-	-	59	.81	153	-17*	3
Raqa	24	8	10	-	8	24	-	1	-	-	8	.34	18	-2	1
Dier-El-Zor	73	93	38	42	119	90	133	161	217	103	107	.46	40	12*	5
National	1941	1819	1827	2045	1353	1092	1269	1283	1083	839	1455	.80	2134	-124*	22

1) Rounded to nearest integer value, except R^2.

* Estimated slope parameter statistically different from zero at the .05 level of significance using a two-tailed t test and 8 degrees of freedom.

Table 27. Regional and National Trend Estimates for Milk Derivatives: Cheese

Regions	Years										Statistical Results[2]				
	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	$\bar{y}$	R^2	$\hat{a}$	$\hat{b}$	s
	Metric tons														
Damascus	2070	2586	1775	1409	2978	2105	2863	4158	4067	4400	2841	.66	1283	283*	72
Dar'a	763	779	857	1443	136	37	85	171	734	603	561	.15	873	-57	49
Sweida	1223	786	726	338	749	355	306	818	446	796	654	.16	863	-38	31
Quintra[1]	-	-	-	-	174	137	17	144	160	121	126	0	132	-2	15
Homs	2225	2180	1606	1491	2045	1493	2833	2323	3853	3944	2399	.50	1258	208*	74
Hama	2140	1900	2175	1872	1578	2555	2449	3337	5362	4827	2820	.65	922	345*	90
Tartous	786	698	499	498	691	1008	778	1076	765	990	779	.34	567	38	19
Lattakia	900	889	1509	1078	1366	6421	489	319	467	815	1425	0	1638	-39	209
Idleb	2011	1595	2057	5165	3743	1857	3795	1882	2713	2432	2725	.01	2567	29	134
Aleppo	8251	9158	9074	11857	6169	4040	5719	6441	4771	5946	7143	.43	9981	-516*	211
Hasakeh	5499	3452	2830	1873	4670	2178	3184	5170	5881	1846	3658	0	3749	-17	179
Raqa	2830	2072	932	410	1006	1001	2058	2582	2762	2577	1823	.10	1298	95	100
Dier-El-Zor	1221	1323	315	324	1335	897	1256	1441	2569	863	1154	.15	705	82	69
National	29919	27418	24355	27758	26640	24084	25832	29862	34550	30160	28058	.17	25681	432	337

1) Regression for the years 1972-1977, inclusive.
2) Rounded to nearest integer value, except R^2.

* Estimated slope parameter statistically different from zero at the .05 level of significance using a two-tailed t test and 8 degrees of freedom.

Table 28. Regional and National Trend Estimates for Milk Derivatives: Ghee

Regions	Years										Statistical Results[2]				
	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	$\bar{y}$	R^2	$\hat{a}$	$\hat{b}$	s
	Metric tons														
Damascus	170	212	216	168	272	155	173	264	268	313	221	.37	161	11	5
Dar'a	779	934	974	721	599	422	434	399	430	493	619	.70	952	-61*	14
Sweida	644	484	510	251	548	360	353	471	345	476	444	.16	530	-16	12
Qunitra 1)	-	-	-	-	92	116	58	198	133	179	129	.40	67	18	11
Homs	1078	1073	615	463	897	1043	1703	2105	1925	1833	1274	.59	471	146*	43
Hama	587	714	356	365	563	681	754	783	816	845	646	.45	431	39*	15
Tartous	296	246	210	263	104	171	150	295	186	234	216	.06	243	-5	7
Lattakia	250	228	208	167	125	80	105	135	76	65	144	.84	255	-20*	3
Idleb	454	326	243	589	363	213	265	349	272	291	347	.08	404	-11	12
Aleppo	2771	2823	2257	1592	2018	1321	1585	1045	921	776	1711	.90	2979	-231*	27
Hasakeh	2902	1246	1095	628	1351	1057	1241	1293	1570	628	1301	.20	1823	-95	66
Raqa	495	544	360	158	236	250	480	603	805	839	478	.31	243	43	23
Dier-El-Zor	1060	1257	153	165	668	297	692	971	1333	614	721	.01	660	11	50
National	11476	10097	7197	5530	7836	6166	7993	8911	9180	7586	8197	.08	9102	-164	200

1) Regression over the years 1972-1977, inclusive only.
2) Rounded to nearest integer value, except R^2.

* Estimated slope parameter statistically different from zero at the .05 level of significance using a two-tailed t test and 8 degrees of freedom.

E. Area Response

Although the results obtained were mixed, efforts had been made in the sector assessment to develop statistically estimated equations that would predict the likely area responses of selected major crops; that is, the area of land that would be planted to certain crops in response to the influence of certain variables such as prices and weather. Such area response predictive equations, along with estimates of yields, would provide government planners and other officials with useful tools in assessing such issues as export possibilities, import needs, and production-consumption balances of domestically produced food crops. Such equations might also be used to predict the consequences of alternative target prices for commodities such as wheat, barley, cotton, sugar beets, and others.

The estimation technique used was multiple linear regression, with the area planted to non-irrigated crops related to the crop's own price, to the price of competing crops, and to selected weather variables. For irrigated crops, the area planted was specified as a function of the crop's own price, the price of competing crops, and the prices of major purchased inputs.

Based on the availability of sufficient time series data for the variables, the following crops were selected: Irrigated - wheat, cotton, sugar beets, potatoes, and cucumbers; Nonirrigated - wheat, barley, lentils, chickpeas, watermelons, and cucumbers.

The following paragraphs summarize the results for crops having announced prices, and for crops considered responsive to wholesale prices. A brief discussion of the techniques used is shown in Appendix 5 and the results for all equations are contained in the technical files of the sector assessment project. Many of the economic and climatic variables thought to be correlated with areas planted of major crops were identified through discussions with Hisham Akhross, Deputy Minister, SPC.

Equations were fit at the Mantika level for any Mantika that historically accounted for one percent or more of national total area planted to a selected crops, either nonirrigated or irrigated. Mohafaza level equations were fit for any Mohafaza that included more than one Mantika which satisfied the latter one percent criterion. Mohafaza equations were fit to an aggregate of those Mantikas which met the criterion only, not to the totals for all Mantika within a Mohafaza.

Crops with Announced Prices

Crop area response predictive equations were statistically estimated for the following crops for which the Syrian Arab Republic announces prices: Wheat: irrigated and nonirrigated; Barley: nonirrigated; Cotton: irrigated; Sugar Beets: irrigated; and Lentils: nonirrigated.

The results of these single equation models were mixed. Mohafaza level equations which were determined to be useful in predicting area planted to crops with announced prices in response to the announced prices are reviewed.

Wheat, Irrigated

Damascus, Hama, Idleb, Aleppo, Hasakeh, Al-Rakka and Deir-ez-Zor Mohafazat are major irrigated wheat producing regions in Syria. Single equation area response predictive models using the announced price of wheat with incorporated bonuses (seven

year series) as the primary independent variable provided statistically significant results only in Al-Rakka. Al-Rakka accounted for approximately 13 percent of the area planted to irrigated wheat nationally in 1977.

The area response predictive equation for irrigated wheat in Al-Rakka Mohafaza is:

(Al-Rakka), y = -9,517 + 36,523 APW - 176 FI + 250 RMI,

where

y	=	area planted to irrigated wheat in the current year by Mohafaza;
APW[1/]	=	the announced price of wheat lagged one year used to approximate the expected price for the current year;
FI	=	the national fuel price index used as a proxy for the cost of fuel consumption in wheat production; and
RMI	=	the national raw materials price index used as a proxy for the cost of the raw materials used in irrigated wheat production.

Many Mantika and Mohafazat estimated equations had relatively high coefficients of determination (R^2). However, the (slope) coefficient associated with the announced price of wheat (APW), parameter was, in each case statistically insignificant.

<u>Cotton, Irrigated</u>

Area response predictive equations were fit to the ten years series, 1968-1977, using the announced price of cotton, the lagged wholesale price of potatoes, and the ratio of announced price of cotton to lagged wholesale price of potatoes as the primary independent variables.

Statistically significant preditive equations consistent with economic theory were developed in Damascus, Homs, Aleppo and Al-Rakka Mohafazat. These Mohafazat accounted for approximately 38 percent of the national area planted to irrigated cotton in 1977. The coefficients of determination and adjusted coefficients of determination are considered adequate for Al-Rakka's estimated area response equation, and marginally adequate for Aleppo and Al-Hasakeh.

The area response predictive equations for Al-Rakka, Aleppo, and Al-Hasakeh Mohafazat are the following:

(Al-Rakka), y = -40,881 + 174,766 APC - 419 FI,

(Aleppo), y = 12,974 + 40,037 APC - 111 FI, and

(Al-Hasakeh), y = 63,759 - 39,680 APC,

[1/] All price variables in this and subsequent equations in this section are reported in constant 1962 Syrian pounds.

where

y = area planted to irrigated cotton in the current year by Mohafaza,

APC = the deflated announced price of cotton lagged one year used to approximate the expected price for the current year, and

FI = the national fuel index used as a proxy for the cost of fuel consumption in cotton production.

Sugar Beets, Irrigated

Single equation area response predictive models incorporating the announced price of sugar beets and the announced price of cotton were found statistically significant and consistent with economic theory only in Hama and Deir-ez-Zor Mohafazat. These two Mohafazat accounted for approximately 17 percent of the national area planted to irrigated sugar beets in 1977. The coefficients of determination and adjusted coefficients of determination for both equations were adequate.

The area response predictive equations for Hama and Deir-ez-Zor Mohafazat are the following:

(Hama), $y = 1{,}044 + 6{,}359\ APS - 1{,}630\ APC$, and

(Deir-ez-Zor), $y = 1{,}288 + 12{,}818\ APS - 2{,}108\ APC$,

where

y = area planted to irrigated sugar beets in the current year by Mohafaza during the period of 1971 through 1977.

APS = the deflated announced price of sugar beets in the current year taken from the time period 1971-1977.

APC = the deflated announced price of cotton in the current year taken from the time period 1971-1977.

Wheat, Nonirrigated

Single equation area response predictive models using a seven year series (1971-1977) were developed using the announced prices of wheat, barley, and lentils and the price ratios of wheat to barley and wheat to lentils as the primary independent variables.

Statistically significant models consistent with economic theory were found only in Homs and Aleppo Mohafazat. The coefficients of determination for each model were adequate but the adjusted coefficient of determination was adequate only in Homs. The model for Homs had a statistically significant estimated coefficient for the price ratio of wheat to lentils parameter. The model for Aleppo had a statistically significant estimated coefficient for the announced price for wheat. Both models also had statistically significant precipitation coefficient estimates.

The area response predictive equations for Homs and Aleppo Mohafazat are the following:

(Homs), y = -13,259 + 71,999 RWL + 1,980 ONDP, and

(Aleppo), y = -790,718 + 3,754,656 APW + 2,181 ONDP,

where

y	=	the area planted to nonirrigated wheat in the current year by Mohafaza during the period 1971 through 1977.
APW	=	the sum of the deflated announced price of wheat and the deflated bonus in the Damascus region in the previous time period.
ONDP	=	the precipitation (mm) during the planting season of October, November and December.
RWL	=	the ratio of the sum of the deflated announced price and bonus of wheat to the deflated announced price of lentils, both lagged one time period.

Using a ten year price series (1968-1977) without bonuses and the same group of primary independent variables resulted in no statistically significant area response predictive models consistent with economic theory for any Mohafaza.

Barley, Nonirrigated

Single equation area response predictive equations were fit for the major barley producing Mohafazat of Syria using a ten year time series (1968-1977). The primary independent variables considered were the announced prices of barley, wheat, and lentils, the wholesale price of chickpeas, and the price ratio of barley to wheat, barley to lentils and barley to chickpeas. Statistically significant models consistent with economic theory were found only in Al-Hasakeh and Al-Rakka Mohafazat.

The area response predictive equations for Al-Hasakeh and Al-Rakka are the following:

(Al-Hasakeh), y = 197,030 + 1,280,611 APB - 405,060 WPC, and

(Al-Rakka), y = -222,361 + 2,828,728 APB,

where

y	=	the area planted to nonirrigated barley by Mohafaza in the current time period during the years 1968-1977.
APB	=	the deflated announced price of barley in the previous time period; taken from the years 1967-1976.
WPC	=	the deflated, average seasonal wholesale price for chickpeas, applicable to the Mohafaza, in the previous time period.
RBW	=	the ratio of the deflated announced price of barley to the deflated announced price of wheat in the previous time period.

Only the Al-Hasakeh model, which included significant coefficients for the barley and chickpea price parameters, had an acceptable coefficient of determination and adjusted coefficient of determination. Approximately 33 percent of the national area planted to nonirrigated barley in 1977 was in Al-Hasakeh Mohafaza.

Lentils, Nonirrigated

Single equation area response predictive models were tested for the ten year time series 1968-1977 using the announced prices of lentils, wheat and barley, the wholesale price of chickpeas, and the price ratios of lentils to wheat, lentils to barley, and lentils to chickpeas as the primary independent variables. Only the Al-Hasakeh models achieved statistically significant results consistent with economic theory. The best (that is, the highest R^2 and $\bar{R}^2$) Al-Hasakeh model had significant coefficients for the lentils to chickpea price ratio and the precipitation parameters. Al-Hasakeh Mohafaza accounted for approximately 27 percent of the national area planted to nonirrigated lentils in 1977.

The area response predictive equation for the Al-Hasakeh Mohafaza is the following:

(Al-Hasakeh), $y = 4{,}218 + 28{,}410\ RLC - 49.6\ DJP$,

where

y	=	the area planted to nonirrigated lentils by Mohafaza during the current time period for the years 1968-1977.
DJP	=	the amount of precipitation (mm) during the planting season months of December and January.
RLC	=	the ratio of the deflated announced price of lentils to the deflated seasonal average wholesale price of chickpeas both for the previous time period, taken from the years 1967-1976.

Crops Considered Responsive to Wholesale Prices

Crop area response predictive equations were statistically estimated for the following crops, considering their respective wholesale prices lagged one production period: Potatoes, irrigated; Cucumbers, irrigated and nonirrigated; Chickpeas, nonirrigated; and Watermelon, nonirrigated.

Results of these single equation area response predictive models were mixed. Mohafaza level equations are reviewed.

Potatoes, Irrigated

Single equation area response models were developed for a seven year time series (1970-1977) using the lagged wholesale price of potatoes and the announced price of sugar beets as the primary independent variables. Statistically significant models consistent with economic theory were found in Dar'a, Homs, Hama and Ghab Mohafazat. The wholesale price parameter estimate was significant in each equation but the coeffi cient of determination (R^2) was acceptable only for Hama. All adjusted coefficients of determination ($\bar{R}^2$) were unacceptable. Hama Mohafaza planted less than 9 percent of the national area in irrigated potatoes in 1977.

Equations were also fit using a ten year price series (1968-1977), with the wholesale price of potatoes as the primary independent variable. Dar'a and Homs Mohafazat had statistically significant coefficient estimates with the expected sign for the wholesale price parameter, but the R^2 and $\bar{R}^2$ were unacceptably low.

Cucumbers, Irrigated

Area response predictive equations considering the lagged wholesale price of cucumbers as the primary independent variable resulted in no statistically significant models consistent with economic theory.

Cucumbers, Nonirrigated

Area response predictive equations were estimated for the major nonirrigated cucumber producing Mohafazat, using a seven year (1970-1977) time series of the lagged wholesale price of cucumbers as the primary independent variable. Statistically significant results consistent with economic theory were found only in Tartous Mohafaza, where the estimated coefficient of the price parameter was significant and both the R^2 and $\bar{R}^2$ were acceptable. Tartous accounted for less than 2 percent of the national total area planted to nonirrigated cucumbers in 1977.

The area response predictive equation for the Tartous Mohafaza is the following:

(Tartous), $y = -473 + 1{,}207\ WPC$

where

y	=	the area planted to nonirrigated cucumbers by Mantika or Mohafaza in the current year for the period, 1971-1977.
WPC	=	the deflated, average seasonal wholesale price, applicable to the Mohafaza in the previous time period; taken from the years 1970-1976.

Chickpeas, Nonirrigated

No statistically significant results consistent with economic theory using the lagged wholesale price of chickpeas as the primary independent variable were found. The wholesale price series was used because the announced price series for chickpeas did not cover a period sufficient for time series analysis.

Watermelon, Nonirrigated

Single equation area response predictive equations were developed for a seven year time series (1970-1977) using the wholesale prices of watermelon and maize, the announced price of chickpeas, and the price ratios of watermelon to chickpeas and watermelon to maize as primary independent variables. No statistically significant results completely consistent with economic theory were found. All prices were lagged one time period.

Conclusions

The announced prices for agricultural commodities, used alone or in conjunction with other commodity price series for inputs such as fuel and materials and with precipitation variables, explained only limited proportions of the variation in areas planted to these selected commodities.

These relatively inconclusive statistical results may have occurred because of: (a) excluded variables, (b) the impact of other institutional constraints, particularly non-free market conditions, (c) the use of linear relationships, (d) incomplete or inaccurate information, and (e) incomplete understanding of the nature of the problem or a misspecification of the problem -- for example, the pricing system may impact area and yield together rather than just area planted.

Appendix 1

Methodology for Crop Trends

Area, production and yield trends for selected major crops were developed using simple linear regressions for ten years (1968-1977) at the national, regional (Mohafaza), and subregional (Mantika) levels. This appendix documents the data used and the basic statistics of regression analysis.

Data

Ten years of agricultural production data (1968-1977) were obtained from the Ministry of Agriculture and Agrarian Reform, Division of Agricultural Statistics, Syrian Arab Republic. Two reaggregations were necessary to create a consistent ten-year base. First, local wheat and Mexican wheat were combined and identified as total wheat. Second, due to regionalization changes which took place from 1968 to 1977, statistics for regions, subregions and areas were reaggregated as follows:

Damascus City Mohafaza	adds into	Damascus Mantika
Daraya Mantika	adds into	Damascus Mantika
Yabarod Mantika	adds into	Al-Nabek Mantika
Mahrda Mantika	adds into	Hama Mantika
Draikish Mantika	adds into	Safita Mantika
Al-Shekh Badr Mantika	adds into	Tartous Mantika
Al-Qardaha Mantika	adds into	Jebleh Mantika
Safita Mantika	adds into	Jabl Sam'an Mantika
Meskna area	adds into	Minbej Mantika
Euphrates area	adds into	Al-Rakka Mantika

Basic Statistics of Regression

Coefficients

In regression analysis a relationship specified in an equation is estimated. If the specified relation is

$$Y_t = a + bX_t + U_t$$

then
$$\hat{b} = \frac{\Sigma(X_t - \overline{X})(Y_t - \overline{Y})}{\Sigma(X_t - \overline{X})^2}$$

and
$$\hat{a} = \overline{Y} - \hat{b}X.$$ [1/]

The variances of the coefficients are respectively

$$\sigma^2_{\hat{b}} = \frac{\sigma_\mu^2}{\Sigma(X_y - \overline{X})^2}$$

$$\sigma^2_{\hat{a}} = \frac{\sigma_\mu^2 \, X_t^2}{n\,\Sigma(X_t - \overline{X})^2}$$

Coefficient of Determination

The explanatory power of regression models can be measured by the coefficient of determination or the R^2. The variation in the dependent variable can be measured by the total sum of squares (TSS) as

$$\Sigma(Y_t - \overline{Y})^2.$$

[1/] X_t is the independent variable; Y_t the dependent variable; U_t the error term considered distributed $N(0, \sigma^2)$; a and $\hat{a}$ are the intercept and intercept estimate, respectively; b and b are the slope and slope estimate, respectively.

The variation of the dependent variable which is explained by the independent variables is measured by the regression sum of squares (RSS) as

$$\Sigma(\hat{Y} - \bar{Y})^2.$$

The variation of the dependent variable which is not explained by the independent variables is measured by the error sum of squares (ESS). Since TSS = ESS + RSS, then RSS = TSS - ESS. Dividing by TSS gives

$$\frac{RSS}{TSS} = 1 - \frac{ESS}{TSS} = R^2.$$

Hypothesis Testing

Often times the coefficients which are estimated from the regression analysis need to be evaluated to determine if they vary significantly from some hypothesized value. Significant variation must be viewed by the probability that the difference between the estimated and the hypothesized values is greater than a range of values determined by a multiple of the standard error of the estimated parameters. The multiple of the standard error is based on the probability level that is selected, the sample size and the underlying probability distribution.

At a 5-percent significance level, the confidence interval constructed from a student's t distribution would be $\pm$ 1.96 $\sigma_{\hat{b}}$. If the difference between the estimated and the hypothesized values ($\hat{b}-b_o$) is less than 1.96 $\sigma_{\hat{b}}$ then the null hypothesis would be accepted. The range of values between b_o - 1.96 $\sigma_{\hat{b}}$ and b_o + 1.96 $\sigma_{\hat{b}}$ is said to be the acceptance region while the rejection region would be

$$\hat{b} > b_o + 1.96\ \sigma_{\hat{b}}$$

$$\hat{b} < b_o - 1.96\ \sigma_{\hat{b}}$$

The significance level is usually selected after considering the trade-offs between Type I and Type II error. If the likelihood of a Type I error is reduced (increased) then the probability of a Type II error is increased (reduced).

To test the hypothesis that a beta coefficient is not zero, the hypotheses $H_0 : b = o$, $H_1 : b \neq o$ are constructed. If the null hypothesis is rejected, it is concluded that the beta is significantly different from zero at the selected significance level.

For 8 degrees of freedom, the multiplier of the standard error for confidence intervals at a 5-percent level of significance is 2.31, ($t_{10-2;}$ 0.975). Under the same circumstances but with an infinite number of degrees of freedom, the multiplier is 1.96, ($t_{\infty;}$ 0.975). Therefore, a rule of thumb is often used. That is that if $\hat{b}/\hat{\sigma}$ exceeds 2 in absolute value, then the null hypothesis is rejected and it is concluded that the beta coefficient is significantly different from zero at a 5-percent level of significance.

Degrees of Freedom

In statistics, degrees of freedom denotes the number of independent components needed to calculate a given quantity. Division by the number of degrees of freedom is the standard procedure for obtaining an unbiased estimator of the variance of a variable. The degrees of freedom of such an estimator will be (n - k) where n is the sample size and k is the number of parameters to be estimated to evaluate the numerator of the estimator. For cases where the population mean U_x is unknown the variance is

$$\frac{\Sigma(x_t - \overline{x})^2}{n - 1}$$

with k = 1 since U must be estimated. If U_x is known, k = 0 and the formula is

$$\frac{\Sigma(x_t - U_x)^2}{n} .$$

In multiple regression analysis, if the values of the intercepts and the beta coefficients are known then the degrees of freedom would equal n. This can be seen by the lack of estimated parameters in the numerator of the variance estimator.

$$\frac{\Sigma\, U_t}{n} = \frac{\Sigma(Y_t - b_o - b_1 x_{1t} - \ldots b_k x_{kt})}{n}$$

However, seldom are these values known. Usually, they must be estimated (the purpose of the regression). In this case the degrees of freedom become n - (k + 1) where k is equal to the number of beta coefficients which must be estimated and the 1 results from the estimation of the intercept. This can be checked by counting the number of parameters which must be estimated in the numerator of the variance estimator.

$$\sigma_\mu^{\ 2} = \frac{\Sigma(y_t - \hat{b}_o - \hat{b}_1 x_{1t} - \ldots \hat{b}_k \hat{x}_{kt})}{n - (k + 1)} .$$

" $\overline{R}^2$ "

The addition of independent variables can increase the coefficient of determination without contributing significantly to the explanatory power of a regression model. Therefore, an alternative measure of the explanatory power has been developed which considers the impact on the degrees of freedom which the number of independent variables produces. This measure is called the $\overline{R}^2$. Mathematically, it is defined as

$$\overline{R}^2 = 1 - (1 - R^2) \left[\frac{n - 1}{n-p-1}\right]$$

where p = # of independent variables.

(1) $R^2 = 1 - \frac{ESS}{TSS}$

(2) $1-R^2 = 1 - (1 - \frac{ESS}{TSS}) = 1 - 1 + \frac{ESS}{TSS} = \frac{ESS}{TSS}$

(3) $1 - [\frac{ESS}{TSS}\frac{(n-1)}{(n-p-1)}] = \overline{R}^2$

(4) $1 - \frac{ESS/(n-p-k)}{TSS/(n-1)} = \overline{R}^2$

(5) $\dfrac{1-\Sigma\hat{\mu}_t^{\,2}/(n-p-1)}{\frac{(Y_t-\overline{Y})^2}{n-1}} = \overline{R}^2$

(6) $\frac{S_\mu^{\,2}}{S_y^{\,2}} = \overline{R}^2$

note: $\overline{R}^2$ removes the bias in R^2.
$\overline{R}^2$ is a biased estimator of the co-variance of Y and $\hat{Y}$.

Interpretations

Linear regression analysis was used to fit area, production and yield trend lines for selected major crops, irrigated and nonirrigated, over the ten year period from 1968 to 1977, at each administrative level. Estimates were made of the intercept (INTERCEPT), the slope (SLOPE) and the standard error (STD ERROR) of the slope estimate. A simple ten year average (AVERAGE) was computed and R^2 (R-SQUARE) was calculated for each fitted equation. An $\overline{R}^2$ may be found by setting n=10 and p=1 in the mathematical identity presented in the previous section.

Applying the 'rule of thumb' with 8 degrees of freedom from hypothesis testing, if the absolute value of the slope parameter estimate divided by its standard error is greater than t = 2.31, the estimated slope would be considered significant (different from zero) in a two-tailed t test with a 5-percent confidence level.[1/] A significant slope estimate coupled with a "high" coefficient of determination (R^2) would indicate a trend which should be carefully examined and considered in any agricultural planning activity.

[1/] a value of t = 3.36 is used at the 1 percent confidence level.

Appendix 2

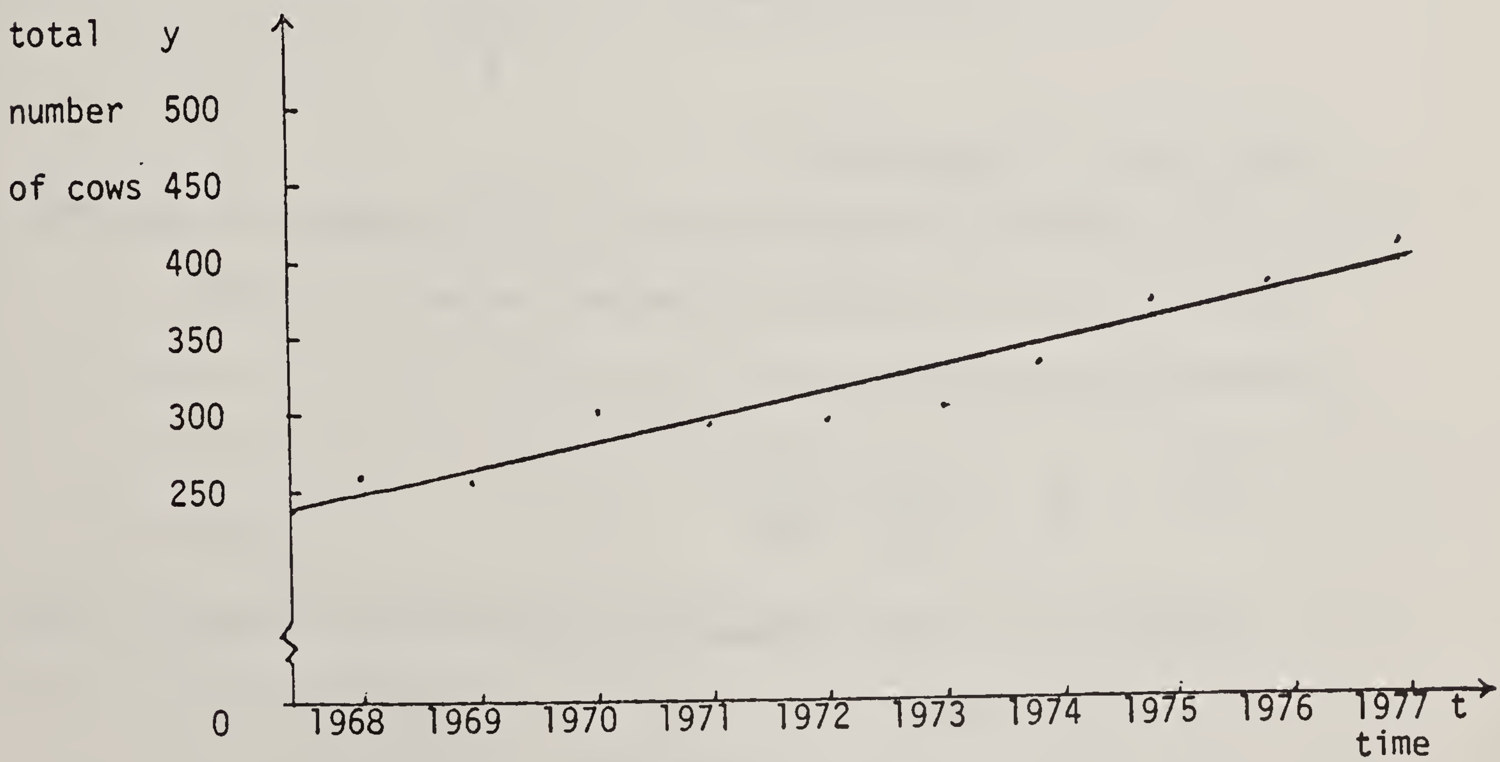
Methodology for Livestock Trends

National and regional trends were developed for the major livestock classes: sheep, cows, calves, goats, oxen, asses, horses and mules, and camels. The trends were based on ten year data (1968-1977) obtained from the Statistical Abstract. All statistics are in units of 1000's, except for camels which are reported in 100's.

Some Basics of Trend Analysis

Trend analysis is an application of linear regression techniques. The technique used is ordinary least squares which minimizes the sum of squares of the deviations between the actual data points and the linear line of best fit. For purposes of illustration the national cow trend is depicted. (Figure 1).

Figure 1.--National Cow Trend



Functional Form

The ordinary least squares algorithm results in the following linear functional form (equation):

1) $y = bt + a$

where: y is the dependent variable (livestock numbers)

t is the independent variable (year)

b is the slope of the regression line (change in y per year)

a is the y axis intercept (constant coefficient)

The slope (b) and the y intercept (a) are determined as follows:

2)
$$b = \frac{N \sum_i t_i y_i - \sum_i t_i \sum_i y_i}{N \sum_i t_i^2 - \left(\sum_i t_i \right)^2}$$

where: N = number of data points

3) $a = \bar{y} - b\bar{t}$

where: $\bar{t}$ = average t value = $\frac{\sum_i t_i}{N}$

$\bar{y}$ = average y value = $\frac{\sum_i y_i}{N}$

Coefficient of Determination

The coefficient of determination (R^2) is a measure of the total variation in y that is accounted for by the regression equation. The coefficient is calculated by:

4)
$$R^2 = \frac{\Sigma (\hat{y}_i - \bar{y})^2}{\Sigma (y_i - \bar{y})^2}$$

where: $\hat{y}_i$ = is the estimated y_i value from the regression equation

$\bar{y}$ = mean

y_i = actual y_i observation.

An R^2 value of 1 results when all the y_i lie on the regression line, i.e., variation in the dependent variable is perfectly explained by the independent variables in the regression equation. If the independent variables account for none of the variation, an R^2 of 0 will be observed.

Determination of Significance

Hypothesis testing can be used to determine if the estimated coefficient for an independent variable in a regression equation is significantly different from another, selected value. The trend analysis for this report uses a T test and T distribution to test whether or not the slope (b) of the trend line is significantly different from zero. If the slope is found not to be significantly different from zero, there may be reason to question the use of the estimated equation for the analysis of trends.

Trend analysis for Syrian livestock uses a two-tailed t distribution, 5 percent confidence level and 8 degrees of freedom which results in a value of 2.306 for T (T= 2.306). To test whether the slope coefficient (b) is significantly different from zero, the value of B is set equal to zero (B = 0) and the general formula for significance is:

$$5) \quad \left| \frac{b - B}{\sqrt{S^2}} \right| > T$$

$$\text{where:} \quad S^2 = \frac{1}{n-2} \frac{\Sigma (y_i - \hat{y}_i)^2}{\Sigma t_i^2 - \frac{(\Sigma t_i)^2}{n}}$$

(s^2 is the variance about the regression necessary to test hypotheses other than the hypothesis B=0)

If equation 5 is satisfied, the slope of the trend line may be considered significant and the value is marked with an asterisk (*) in the data tables.

Using Trend Analysis

In this section an example of using trend analysis is presented for the national cow trend equation:

$$y = 15.16t + 242.2$$

where: y = total cows in 1000's

t = year; $t = 1$ for 1968, $t = 2$ for 1969, ... , $t = 10$ for 1977, .

data: $b = 15.16$

$a = 242.2$

$\bar{y} = 325.6$

$S^2 = 4.42$

$R^2 = .87$

This is the same equation graphically depicted (Figure 1). An R^2 of .87 shows correlation. The slope coefficient (b) is significant as

$$\frac{15.16-0}{\sqrt{4.42}} = 7.21$$, which exceeds 2,306.

If estimates of total national cow numbers are desired for 1978 from the 1968-1977 trend, set $t = 11$ and solve the equation:

$$y = 15.16\ (11) + 242.2$$

$y = 409$ indicating an estimate of 409,000 cows at the national level for 1978.

Appendix 3

Methodology for TDN Requirements

This Appendix presents a definition of Total Digestible Nutrients (TDN) and assumptions used in subsequent derivations.

TDN: Total digestible nutrient requirements represent the approximate energy value required by a class of livestock.

The TDN coefficients assumed are:

Livestock	Unit of Measure	Metric ton(s) of TDN Required Per Unit of Measure
Sheep	1 Animal	.37
Goats	1 "	.37
Cows	1 "	1.99
Calves	1 "	.91
Horses and Mules	1 "	2.31
Asses	1 "	1.49
Camels	1 "	1.49
Oxen	1 "	1.99
Milk	1 kg.	.32

The following Tables 1 and 2 present estimates of the total annual production of livestock feed sources, including crops, residuals, pasture, and range, from Boykin and Khoury, Range and Livestock Resources, Volume 2, Chapter III.

Table 1. Estimated Total Annual Production of Crops, Including Residuals, Pasture and Range for Use in Livestock Production, Dry Matter Basis

	Area (1977)	Yield/Ha Aug. (1971-1977)	Production	Grains		Straw		Stubble		Residuals	
				Factor	Grains	Factor	Chaff	Factor	Stubble	Factor	Amount
	1,000 Ha	MT	1,000 mt.	%	1,000 mt.	%	1,000 mt.	%	1,000 mt.	%	1,000 mt.
Wheat	1,528	1.14	1,742	1	17.4	10	174.2	50	784.0		
Barley	1,021	.61	632	90	560.7	10	62.3	50	280.5		
Maize	26.2	1.94	51	50	25.5			60	30.6		
Millet	24.9	.72	18	50	9.0			70	12.6		
Lentils	117.3	.71	83			80	66.4				
Chickpeas	41.1	.63	26			80	15.6				
Dry Broad Beans	8.0	1.49	12			80	9.6				
Dry Haricot Beans	6.1	1.57	10					70	7.0		
Peas	.8	.84	1					80	.8		
Dry Kidney Beans	1.0	.88	1					80	.8		
Rambling Vetch	38.5	.74	28					100	28.0		
Flowering Sern	16.6	.83	14					100	11.0		
Bitter Vetch	27.4	.59	16					100	16.0		
Peanuts	10.9	1.78	19							30	5.7
Sunflower	5.0	1.11	6							50	3.0
Cotton	186.5	1.93	360							50	180.0
Sugar Beets	12.2	24.11	294							10	29.4
Pasture	13.9	3.60	50								
Fallow Land	1,776	.1	178								
Range	7,442	.2	1,488								

Table 2. Estimated Total Annual Production of Crops Including Straw, Residuals, Pasture and Range, and By-products Used in Livestock Production, TDN Measure

	Total Amount	Used by Livestock Factor	Used by Livestock Dry Matter	Used by Livestock TDN	Total TDN
	1,000 mt.	%	1,000 mt.	%	1,000 mt.
Feed Grains					
Broken Wheat	17.4	100	17.4	78	13.6
Barley	623.0	90	560.7	76	426.1
Maize	51.0	50	25.5	82	20.9
Millet	18.0	50	9.0	78	7.0
Rambling Vetch	28.0	100	28.0	75	21.5
Flowering Sern	14.0	100	14.0	75	10.5
Bitter Vetch	16.0	100	16.0	76	12.0
Straws					
Chaff (legumes)	91.6	100	91.6	55	50.4
Chaff (cereals)	236.5	100	236.5	34	80.4
Stubbles					
Wheat & Barley	1,064.5	100	1,064.5	30	319.4
Legumes	66.6	100	66.6	54	36.0
Corn	43.2	50	21.6	46	9.9
Residuals					
Cotton	180.0	100	180.0	43	77.4
Sugar Beets	29.4	100	29.4	54	15.9
Sunflowers	3.0	60	1.8	40	.7
Peanuts	5.7	100	5.7	40	2.3
By-products					
Wheat Bran	110.0	100	110.0	59	64.9
Sugar Beet Pulp	20.0	100	20.0	66	13.2
Cottonseed Cake	110.0	100	110.0	62	68.2
Cottonseed Hulls	60.0	100	60.0	51	30.6
Sunflower Seed Cake	1.33	100	1.3	65	.8
Sunflower Seed Hulls	3.0	100	3.0	50	1.5
Pasture Land	50.0	100	50.0	52	26.0
Fallow Land	178.0	100	178.0	40	71.0
Range Land	1,488.0	100	1,488.0	46	684.7
Total Estimated Available TDN:					2,064.9

Appendix 4

Methodology for Livestock Product Trends

Regional and national trend estimates for selected livestock and poultry products were developed using ordinary least squares linear regression analysis and statistical inference. Trend lines were estimated from data for the years 1968-1977 obtained from the Statistical Abstract. Eggs, chickens, goat hair, washed wool, milk, butter, cheese and ghee are the products analyzed.

Trend Analysis

Trend analysis is a simple application of ordinary least squares linear regression. The statistical model assumes that the response y_i is related to the value t_i of the controlled variable as follows:

$$y_i = a + bt_i + e_i \qquad i = 1, 2, \ldots , n$$

where y_i is the dependent variable (livestock or poultry product numbers)

- a is the unknown intercept of the regression line with the y axis (constant parameter)
- b is the unknown slope parameter of the regression line (the change in y per unit change in t)
- t_i are the independent controlled variable (year, with 1968=1, 1969=2, ... , 1977=10)
- e_i are the unknown error components assumed $\sim N(0, \sigma^2)$, i.e. normal distribution with mean of zero and homscedastic variance.

The ordinary least squares principle, which basically consists of minimizing the overall squared deviation of the predicted response from the observed response, is well documented in most elementary statistics texts.[1] The

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1) For example, see Bhattacharyya, Gouri K. and Richard A. Johnson, Statistical Concepts and Methods, John Wiley and Sons, 1977.

estimated least squares regression line[1] is:

$$\hat{y}_i = \hat{a} + \hat{b}\ t_i \ .$$

where the estimated slope $(\hat{b})$ and estimated intercept $(\hat{a})$ can be determined using the following formulas:

$$\hat{b} = \frac{n \sum_i t_i\ y_i - \left(\sum_i t_i\right)\left(\sum_i y_i\right)}{n \sum_i t_i^{\ 2} - \left(\sum_i x_i\right)^2}$$

$$\hat{a} = \bar{y} - b\bar{t}$$

where n is the number of observations or data points

$\bar{t}$ is the mean value of t $= \dfrac{\sum_i t_i}{n}$

$\bar{y}$ is the mean value of y $= \dfrac{\sum_i y_i}{n}$

y_i is the actual observed value for y

$\hat{y}_i$ is the estimated y value from the regression equation

Coefficient of Determination

The coefficient of determination (R^2) is a measure of the total variation in the dependent variable (y_i) accounted for by the regression equation. The coefficient can be computed using the following formula:

$$R^2 = \frac{\Sigma\ (\hat{y}_i - \bar{y})^2}{\Sigma\ (y_i - \bar{y})^2}$$

where $\Sigma(\hat{y}_i - \bar{y})^2$ is the regression sum of squares (RSS) or the variation in the estimated $\hat{y}_i$ values about their mean explained by the regression.

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1) The hat (^) above a parameter indicates an estimate.

$\Sigma (y_i - \bar{y})^2$ is the total sum of squares (TSS) or the total variation of the actual y_i values about their mean.

TSS - RSS = error sum of squares (ESS) = Σe_i^2

TSS = ESS + RSS

The value of R^2 ranges from 0 to 1. An R^2 value of 1 results when all the y_i lie on the estimated regression line, i.e. variation in the dependent variable is perfectly explained by the independent variable(s) in the regression equation. If the independent variables explain none of the variation, an R^2 of 0 will be observed. Since R^2 measures the proportion of variation in the dependent variable explained by the explanatory, independent variable(s), a "high" R^2 is a desirable result of fitting a trend line to the livestock and poultry products data.

Degrees of Freedom

In statistics, degrees of freedom denote the number of independent components needed to calculate a given quantity. Division by the number of degrees of freedom is the standard procedure for obtaining an unbiased estimator of the variance of a variable. The degrees of freedom of such an estimator will be (n - k) where n is the sample size and k is the number of parameters to be estimated to evaluate the numerator of the estimator. For this report n = 10 since for each product ten years of data are used and k = 2 since the parameters a and b are estimated by $\hat{a}$ and $\hat{b}$, respectively. Then, the degrees of freedom or df = 10-2=8.

Determination of Significance - Hypothesis Testing

Hypothesis testing can be used to determine if the estimated coefficient for an independent variable in a regression equation is significantly different from another, selected value. The trend analysis for this report uses a t test

and t distribution to test whether or not the estimated slope parameter (b) of the trend line is significantly different from zero. If the slope is found not to be significantly different from zero, there may be reason to question the use of the estimated equation for the analysis of the trends.

Trend analysis for Syrian livestock and poultry products uses a two tailed t test, 5 percent confidence level and 8 degrees of freedom which results in a t statistic of 2.306.

The general formula used to compute a t value to test for significance is:

$$t \text{ computed} = \left| \frac{\hat{b} - \beta}{s} \right|$$

where $\hat{b}$ is the estimate of the slope parameter

β is the selected value being tested

s is the estimated standard error of the estimated slope parameter

$$\text{and } s = \left(\frac{1}{n-2} \; \frac{\sum_i (y_i - \hat{y}_i)^2}{\sum_i (t_i - \bar{t}_i)^2} \right)^{\frac{1}{2}}$$

To test whether the estimated slope parameter is significantly different from zero, the value of β is set equal to zero. If

$$t_{\text{computed}} > t_{\text{statistic}}$$

then, the estimated slope parameter of the trend may be considered significant and the value is marked with an asterisk (*) in the data tables.

Use of the Results of Trend Analysis.

The data tables for regional and national livestock and poultry products include ten years of data, the ten year mean ($\bar{y}$), the coefficient of determination (R^2), the estimated intercept parameter ($\hat{a}$), the estimated slope parameter ($\hat{b}$) and the estimate of the standard error of the estimated slope parameter (s).

Simple estimated trend equations are considered inadequate if they result in low coefficients of determination and/or non-significant estimated slope parameters. Trend analysis does not attempt to explain casusality. It is undertaken to indicate where reliable trends exist so that they may be considered in agricultural planning activities.

The results of trend analysis are reported by product only for those areas with high R^2 and significant $\hat{b}$. The standard error of $\hat{b}$ is reported in parenthesis under the $\hat{b}$ parameter.

Appendix 5

Methodology for Area Response Predictive Equations

In participation with members of the Syrian Agricultural Sector Assessment (SASA) project and the State Planning Commission (SPC), crops to be considered and the relevant economic and climatic variables were identified. Estimation procedures selected were determined through consideration of the uses to be made of the predictive equations by SARG planning personnel and the adequacy of data to fulfill the requirements of alternative methods of estimation.

Estimation Procedures

Likely production can be viewed as the supply function for a particular good such as an agricultural commodity. The aggregate supply function for a commodity is defined as the horizontal summation of the relevant segments of the marginal cost functions of all firms producing the commodity. In practice, considerable effort and information are needed to accomplish the summation of the marginal cost curves of all firms to obtain the aggregate supply function for a commodity. Therefore, other methods for obtaining estimates of the aggregate supply function for a commodity are often employed.

One method is to directly estimate, using econometric techniques, the aggregate supply function. Variables generally incorporated as independent variables in such a functional estimate of aggregate supply are those which underlie the derivation of the marginal cost functions of the individual firms. Such variables would include variables representing the physical production processes for the commodity (the "production function"), and those representing the prices and physical quantities of inputs used in the production process (the "cost equation" and "expansion path"). Furthermore, in direct estimation of an aggregate supply function, the commodity price and the price of competing commodities are often incorporated as independent variables. To summarize, in direct estimation of an aggregate supply function for an agricultural commodity, the following variables (or some combination thereof) are generally incorporated as independent variables:

1. Price of commodity

2. Price of competing commodities

3. Cost of major inputs in the production of the commodity (such as seed, fertilizer, fuel, labor, etc.)

4. Key variables representing the physical production process (such as climatic factors and/or land quality conditions).

5. Variables representing commodity control or production inducement programs (such as hectare allotments and/or required rotations).

When the desire is to estimate the aggregate supply functions of crops, often indirect estimation is used rather than the direct estimation procedure just discussed. When indirect estimation is used, there are separate functions estimated for area planted and yield, with the aggregate supply function viewed as the product of the two -- (area planted) X (yield). The variables used for aggregate supply function estimation are partitioned and used to estimate either the area planted or yield

functions. For instance, particular weather variables such as rainfall during the growing season and mean temperature during the growing season would be expected to be more heavily correlated with yield than area planted. Likewise, prices for a commodity would be expected to be more highly correlated with area planted than yield.

Indirect estimation of the aggregate supply function is preferred when there is extreme variability in a particular independent variable and/or there is a policy variable that is thought to be highly correlated with supply that needs further evaluation.

The supply of several major nonirrigated Syrian crops have been quite variable over the past decade. Much of this fluctuation has been attributed to fluctuations in yields due to variability in weather conditions. Based on this consideration and on the interest SARG planners have in achieving a better understanding of the correlation of crop area planted with target prices announced for several major commodities prior to planting, it was decided the indirect estimation of likely supply was most desirable. The remainder of this report discusses the predictive equations for area planted.

The estimation technique used to obtain the area response estimates is multiple linear regression. All predictive equations for nonirrigated crops are specified as:

area planted of commodity "a" = f (price of "a", price of competing crops, selected weather variables)

For irrigated crops a similar expression is used:

area planted of commodity "a" = f (price of "a", price of competing crops, major purchased input prices)

The weather variables to be considered are those hypothesized to affect farmers' decisions to plant a particular crop. Those identified in discussions were (a) the quantity of rainfall during the months of planting and (b) the number of rainfall events during the planting period. As a matter of practice Syrian farmers are thought to prepare seedbeds for planting prior to the planting season and then await the rainfall to actually plant. They are thought to base planting decisions on weather variables they can observe, such as those described. For statistical estimation purposes, the ratio of these two variables is also considered -- average rainfall per event during the planting period. The relevant rainfall events were identified through consultation with Syrian planning personnel and reference to available crop calendars. Omitted from consideration were weather variables that would obviously affect crop yield, but would not be observable at the time planting is being considered.

Price variables being considered are of three general types. The first are target prices announced at the national levels for major crops prior to harvest. A second type is wholesale prices determined periodically by mohafaza during the growing season. A third type is wholesale prices determined periodically during the growing season for major markets (spot market prices). The appropriateness of each price series to the area response equations are specified by crop. The general approach will be to specify area response as a function of lagged prices for those crops with target prices and lagged wholesale prices for those crops with mohafaza-level prices or spot market prices.

Determination of Crops to be Considered

Two principal criteria were used to determine those crops for which area response predictive equations would be estimated. These were:

1. Crops of interest to the sector assessment project and/or the SPC.

2. The availability of sufficient time series data for variables to be included in the estimations of those crops identified under the first criterion.

   a. A minimum of ten years coverage of area planted for each crops, preferably the years 1968 to 1977, inclusive.

   b. A farm level price for the ten year period 1967 to 1977, inclusive, for each crop to be considered.

   c. Ten years of data for all weather variables considered relevant to the crop planting decisions.

   e. Ten years of data for all purchased input prices for major inputs for each crop considered (especially the irrigated crops).

Through preliminary deliberations with the sector assessment project and the SPC personnel, 16 crops were identified as being of extreme interest. The annuals identified were: 1) wheat, 2) barley, 3) lentils, 4) chickpeas, 5) dry broad beans, 6) cotton, 7) sugar beets, 8) tomatoes, 9) potatoes, 10) watermelon, 11) dry onions, 12) cucumbers, and 13) peanuts. The principal perennials identified were: 1) grapes, 2) apricots, and 3) olives.

To determine the needs for considering the nonirrigated and irrigated portions of the areas planted for annual crops, national level data were reviewed (Table 1). Predictive equations for irrigated crops were to be considered, if adequate time data were available, for: wheat, dry broad beans, cotton, sugar beets, tomatoes, potatoes, dry onions, cucumbers, and peanuts. Predictive equations for nonirrigated annuals were to be considered for: wheat, barley, lentils, chickpeas, dry broad beans, watermelon, and cucumbers.

The variables thought to be correlated with the areas planted of irrigated annual crops were identified in collaboration with Syrian planning personnel by crop (Table 2).

Similarly, the variables thought to be correlated with areas planted of nonirrigated annual crops were identified in collaboration with Syrian planning personnel (Table 3).

After a review of the variables to be correlated with the areas of the crops of interest, several crops were not given further consideration because of the lack of needed information. Crops deleted from consideration and the lacking data series by crop were:

Dry broad beans, irrigated

- Need a complete price series that includes the years 1971-1974.
- Need further specification of competing crops.

Table 1: Annual Crops, Nonirrigated and Irrigated Plantings as a Proportion of Total Area Planted in Each Crop 1975-1977 Averages

Crop	Irrigated	Nonirrigated
Wheat	11.3[1]	88.7
Barley	1.3	98.7
Lentils	3.6	96.4
Chickpeas	0.8	99.2
Dry Broad Beans	69.4	38.8
Cotton	92.7	7.3
Sugar Beets	84.5	15.5
Tomatoes	63.8	36.2
Potatoes	87.1	12.9
Watermelon	5.8	94.2
Dry Onions	75.7	24.3
Cucumbers	43.7	52.3
Peanuts	100.0	0.0

[1] Area response predictive equations are to be developed for those underlined.

Table 2: Areas Planted of Irrigated Annual Crops and Possible Correlated Variables

Possible Correlated Variables:	Areas Planted of: Wheat	Dry Broad Beans	Cotton	Sugar Beets	Tomatoes	Potatoes	Dry Onions	Cucumbers	Peanuts
Price of:									
Wheat	x								
Dry Broad Beans 1/		x							
Cotton			x	x	x		x		
Sugar Beets			x	x	x	x	x		
Tomatoes 1/			x	x	x	x	x		
Potatoes			x	x	x	x	x		
Dry Onions 1/			x	x	x	x	x		
Cucumbers								x	
Peanuts 1/									x
Maiz			x	x					
Fertilizer 1/	x		x	x	x	x	x		
Fuel	x		x	x	x		x		
Seed Potatoes 1/						x			
Farm Labor 1/			x	x	x	x	x		

1/ Time series incomplete or not readily available.

Table 3: Areas Planted of Nonirrigated Annual Crops and Possible Correlated Variables

Possible Correlated Variables:	Areas Planted of: Wheat	Barley	Lentils	Chick Peas	Dry Broad Beans	Cotton	Water-Melon	Cucum-bers
Price of:								
Wheat	x	x						
Barley	x	x						
Lentils	x		x	x				
Chickpeas			x	x				
Dry Broad Beans[1/]					x			
Cotton						x	x	
Watermelon						x	x	
Cucumbers								x
Rambling Vetch[1/]			x					
Bitter Vetch[1/]			x					
Sesame [1/]						x	x	
Maiz							x	
Sorghum[1/]							x	
Rainfall in:								
Oct., Nov., Dec.	x	x						
Dec., Jan.			x	x				
April, May						x		
May, June								
Number of Rain-fall events in:								
Oct., Nov., Dec.	x	x						
Dec., Jan.			x	x				
April, May								
Ave. Rainfall per event in:								
Oct., Nov., Dec.	x	x						
Dec., Jan.			x	x				
April, May						x		

[1/] Time series incomplete or not readily available.

Dry broad beans, nonirrigated

- Need a complete price series that includes the years 1971-1974.
- Need further specification of competing crops.

Tomatoes, irrigated

- Need a complete price series

Dry Onions, irrigated

- Need a complete price series

Peanuts, irrigated

- Need a price series for sufficient period of time necessary to conduct time series analyses. The target price series is only available for five years.

For watermelon and lentils (both nonirrigated) considered in this report, time series data on several correlated variables were not readily available for consideration in the analyses. The incomplete data series are:

- Price series for rambling vetch
- Price series for bitter vetch
- Price series for sesame
- Price series for sorghum

Possible refinement of the area response estimates for watermelon and lentils might be achieved through the incorporation of these data.

The perennial crops of interest to planning personnel -- grapes, apricots, and olives, need further consideration prior to the estimation of area response functions. Additional information needs are:

1. Specification of the lag periods between orchard establishment and production.

2. Specification of competing crops.

3. Acquisition of price time series for a sufficient period to allow lagged price or partial adjustment models to be statistically fit.

Determination of Mantika Coverage

The general criterion used to determine which mantikas were to be considered for area response predictive equations was the percent of the national area planted in a crop that was planted in the mantika. As a general rule, an area response equation was considered if the mantika accounted for one or more percent of the national area planted of the crop for the 1976 and 1977 crop years (Table 4).

Interpretation of Results

Different equations were estimated for each crop depending upon the relationships suggested by SARG officals and the availability of data. The most notable

Table 4: Crops, by Montika, For Which Area Response Predictive Equations Were Estimated

	Irrigated Crops									Nonirrigated Crops							
	Wheat	Dry Broad Beans 1/	Cotton	Sugar Beets	Tomatoes 1/	Potatoes	Dry Onions 1/	Cucumbers	Peanuts 1/	Wheat	Barley	Lentils	Chickpeas	Dry Broad Beans 1/	Cotton	Watermelon	Cucumbers
Damascus City 01																	
Damascus City 011		x			x		x										
Damascus 02																	
Damascus 021		x		x	x	x	x	x									
Duma 022	x	x	x	x	x	x	x	x									
El Tal 023						x											
Qatana 024		x				x	x						x				
Zabadani 025						x							x				
Nabek 026						x											
Qatifa 027		x				x	x	x									
Doria 028		x															
Yabarod 029						x											
Dar'a 03																	
Dar'a 031					x	x	x	x		x		x	x				
Izra 032					x	x	x			x		x	x			x	x
Sweida 04																	
Sweida 041										x		x	x			x	x
Shahba 042												x	x			x	x
Salkhad 043										x			x				
Qunitra 05																	
Ounitra 051		x											x				
Zoia 052																	
Homs 06																	
Homs 061		x		x	x	x	x	x		x	x	x			x	x	x
Talkalakh 062		x			x	x		x	x	x				x			
Mokhram 063										x	x						
Rastan 064		x	x	x		x	x							x			
Tadmar 065																	
Oasir 066		x		x		x	x										
Hama 07																	
Hama 071	x	x	x	x	x	x	x			x	x	x	x	x	x	x	x
Salamiya 072	x	x				x	x			x	x	x			x		
Masiaf 073						x							x	x			x
Mahrda 074		x		x		x	x			x				x		x	
Ghab 08																	
Ghab 081			x	x	x	x	x	x		x		x		x	x	x	

See footnote at end of table.

Continued

Table 4: Crops, by Montika, For Which Area Response Predictive Equations Were Estimated--Continued

		Irrigated Crops									Nonirrigated Crops							
		Wheat	Dry Broad Beans 1/	Cotton	Sugar Beets	Tomatoes 1/	Potatoes	Dry Onions 1/	Cucumbers	Peanuts 1/	Wheat	Barley	Lentils	Chickpeas	Dry Broad Beans 1/	Cotton	Watermelon	Cucumbers
Tartous	09																	
Tartous	091					x	x		x	x				x	x			
Banias	092					x			x	x				x	x			
Safita	093					x			x	x					x			x
Darikish	094						x								x			
Shekh Badr	095														x			
Lattakia	10																	
Lattakia	101					x			x	x								
Hafa	102														x			
Jableh	103					x			x	x	x							
Qardaha	104										x							
Idleb	11																	
Idleb	111	x		x	x	x		x			x				x	x	x	x
Harem	112								x			x	x		x	x	x	x
Jisr	113					x			x		x			x	x	x		x
Ma'ra	114										x	x	x			x	x	x
Ariha	115										x			x	x	x		x
Alleppo	12																	
A'zaz	121	x	x	x		x	x	x	x		x		x			x	x	x
A'farin	122	x	x					x			x		x	x		x	x	
Bab	123	x	x	x		x	x	x	x		x	x	x				x	
Manbaj	124		x	x	x	x		x			x	x						
Jarablos	125		x								x						x	
A'in El A'rb	126	x		x		x		x			x	x	x					
Jabl Sam'an	127	x	x	x		x		x	x		x	x	x			x	x	x
Safira	128		x					x			x	x	x					
Hasakeh	13																	
Hasakeh	131	x		x		x		x	x		x	x						
Qamishli	132	x		x				x	x		x	x	x				x	
Mal Kai	133										x		x				x	x
Ras El A'in	134	x		x							x	x	x					x
Raqa	14																	
Raqa	141	x	x	x	x	x					x	x						
Tel Abiad	142	x		x							x	x						
Dier El Zor	15																	
Dier El Zor	151	x		x	x	x		x	x		x	x						
Maiadin	152	x		x		x			x									
Bokamal	153	x		x		x		x	x									

1/Time series incomplete or not readily available; therefore predictive equations were not estimated.

relationships absent in the equations estimated here are those including inputs such as fertilizer and labor. Lack of data precluded their consideration.

In most cases, the equations were estimated from a time series consisting of the ten years from 1968 through 1977. However, if a price series was available that included at least some of the bonuses as well as the announced price, alternative equations were estimated from the seven years from 1971 to 1977. Details on the results from all equations are contained in the technical files of the natural resources section of the assessment project.

The various equations estimated for each crop can be evaluated by using three principal criteria: (a) the R^2 or $\bar{R}^2$ of the equation; (b) the statistical test of whether or not an estimated beta coefficient is significantly different from zero; and (c) the consistency of the signs of the estimated beta coefficients with economic and agronomic theory.

Expected signs for the beta coefficients of the following relationships are:

area planted with own price	- positive (as the product's price increases, the area planted increases)
area planted with input price	- negative (as price of input increases, the area planted decreases)
area planted with price of competing crop	- negative (as price of competitive crop increases, less area is planted to original crop)
area planted with ratio of own price to competing price	- positive (as the price of crop increases relative to substitutes, the area planted increases)
area planted with rainfall	- positive (as rainfall increases, more area is planted to the crop)

These expectations in the various relationships are based on static, <u>ceteris paribus</u> assumptions. However, the dynamics of the planting decisions could easily alter the expectations. For example, in many parts of the United States, during drier years more sorghum is planted than in wetter years due to switches from less drought resistant crops such as wheat. The implications of the dynamics of the situation in Syria needs to be pursued further.

Without trade-offs between the three previously mentioned criteria, selection of the best or most acceptable equation can be easy. However, if conflicts occur between them, the uses for the equations must be considered. Different uses for the equations may require different criteria for selection. Diagnostic or policy instrument impact analyses may require different variables or forms than predictive analysis. In the former case, the statistical significance of beta coefficients could be more important than the $\bar{R}^2$. In the case of area predictions and forecasts, the amount of variation which is explained by the equation could be of more importance.

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CHAPTER III

FARMING SYSTEMS

By

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(Continued)

PREFACE

Appreciation is expressed for the assistance provided by Khalid Ubery, Ministry of Agriculture and Agrarian Reform, who served as counterpart throughout the field work and preparation of this report. Fouad Kardouss, Head of the Exploitation Service, MAAR, provided suggestions for collection and interpretation of farming systems information.

Farmers and officials at field locations were very helpful in providing a wealth of information, and their cooperation is also appreciated greatly.

FARMING SYSTEMS

A. Introduction

Purpose and Scope of Study

The purpose of this study is to delineate and describe the most significant farming systems in Syria, with reference to major farming areas; and to describe and analyze typical farms (in quantitative and subjective terms), including their conditions and their restraints to operation, inputs, production practices, income, levels of living, and employment alternatives.

This work parallels the farm surveys conducted by the Agricultural Sector Assessment and is intended to be combined with the survey results so as to facilitate further research regarding typical farms and their characteristics. It is intended that the typical systems be evaluated in terms of general standards of efficiency and appropriateness for existing conditions. More specifically, the purpose is to understand how farming operations are carried out in Syria and identify those characteristics that could be improved. This would provide the basis for evaluative farm management studies of alternative crop patterns, resource use, etc.

This research was carried out during January - March of 1979. The data-gathering process itself was about equally balanced among farmer interviews, touring of major farming areas, and interviews with knowledgable agricultural officials. Nearly all Mohafaza level offices of the Ministry of Agriculture and Agrarian Reform (MAAR) were visited, as well as several Manatik level offices. In addition to several visits with MAAR officials in Damascus, Ministries, Establishment, and Organizations with functions relating to agriculture were interviewed. Twenty-one days were spent in the field. Approximately 120 farmers were visited either as individuals or in small groups.

Farming System Defined

"Farming Systems" is an expression of widespread use in a variety of contexts. Its usage has to some extent decreased the value of the term for communication. Without a common definition the term may hinder writing and discussion.

The word "system" suggests the way in which all of the parts, of economic enterprise in this case, add up to a whole. System suggests complicated causal relationships which may be interdependent and interrelated.

The terms "type-of-farm" and "farming systems" are different but closely related. A "type-of-farm" is usually defined according to its major commodities. "Farming system" refers to the process and/or methodology and the various associated relationships that exist within a "type-of-farm". Where a farm is producing just one commodity the "system" and the "type-of-farm" are the same if interrelationships are considered.

Although a group of farming systems may be described it should be realized that they are not static. During a time period, a farmer may start out with a set of constraints which may include: resource constraints (land, labor, and capital); institutional constraints (property rights, markets, etc.), and agro-climatic constraints (temperature, rainfall, soils, climate). These constraints, along with the farmer's knowledge about prices and technology and decisions about fixed resource allocation, may lead to net revenue and production. In the time period t+1 the farmer makes investment decisions relative to his knowledge of technology and prices and his experience in time period t. The investment decisions in turn affect the constraints in time period t+1 and so on. Thus, a farming system is never static.

The classification of farming systems focuses on a hierarchy of constraints. In this work relating to Syria, the intent was to identify the typical types of farms and to describe the systems according to major constraints. Once the typical types of farms were identified according to the commodities produced, the attempt was to further classify them as irrigated vs. nonirrigated because rainfall is an overriding constraint to Syria agriculture. In Syria, the hierarchy of constraints and classification might be:

Commodities Produced
Production Regions
Irrigated vs. Nonirrigated
Farm size
Degree of mechanization
Other:
- Form of Business Organization
- Finance
- Tenure

B. The Administrative Structure for Agricultural Planning and Production

The following portions of this section attempt to describe and comment upon the economic and administrative structure within which the farmer produces. Extensive attention is also directed toward the planning process as it influences farmer land cropping decisions, resource allocations, production input availability, etc.

Administrative Division

Syria is administratively divided into 14 Mohafazat (singular: Mohafaza). Each Mohafaza is generally divided into several Manatik. Each Mantika (pl. Manatik) is further divided into smaller administrative units called Nawahi. A Nahia contains several villages, with a village the smallest administrative unit.

The Planning Process

Basically, general cropping patterns, production and input utilizations for agriculture are planned in Syria. The primary functionaries in this process are the farmers, the Ministry of Agriculture and Agrarian Reform (MAAR), the Peasants' Union, the Agriculture and Cooperative Bank, and the State Planning Commission (SPC). Many other agencies are also involved in this process. Planning is generally done on an annual basis within the context of National Five-Year Plans. After information regarding desired plantings of major crops is passed up from the farmer through the village, cooperative, Manatik and Mohafaza to the National level, final plans for hectarages of major crops are determined. The hectarage plans are then passed down via the S.P.C., MAAR and the Peasants' Union to various governmental departments and ultimately to farmers.

The Licensing Process

Implementation of planned cropping patterns is carried out by a licensing process administered for private farmers by the MAAR. Cooperatives are licensed by the Peasants' Union and the MAAR as well as other agencies. In the fall of each year a date is announced on which farmers may obtain licenses for the subsequent year.

For private farmers, a number of items must be certified by the agriculture office representative at the Mantika level in order for him to be licensed. They are as follows:

1. He must own or control his land and cultivate it.
2. He must not be a member of a cooperative.
3. He must have a license from the appropriate authorities if he is irrigating his land.
4. Formal papers should be completed by the farmer describing his general operation.

When the above approvals are complete the farmer can, through the Mantika office, obtain a license specifying hectarages of various crops as well as quantities of inputs (primarily, seed, fertilizers, chemicals, and credit) that can be obtained or borrowed from the Agricultural Cooperative Bank.

Farmer Responsibilities

Rules and regulations cover the crops to be licensed, the quantity and usage of inputs, and the types of cultural practices to be followed. Often these factors vary according to stabilization zone.

Commodities Licensed

All of the main agricultural crops produced in Syria are licensed. This includes cereals, cotton, vegetables, tobacco, and sugar beets. All other commodities are licensed if the farmer desires a loan from the Agricultural Cooperative Bank. For some commodities such as tobacco and sugar beets licenses are handled on an allotment or contract basis in cooperation with particular organizations or establishments responsible for those commodities. In the case of tobacco, the license is tied to the farmer on an annual basis and penalities are assessed to those farmers who market less than they were licensed for.

Appendix A shows the relationship of planned and actually planted hectarages of major crops for the 1976-1977 crop year. Two generalities appear (keeping in mind that this is only one year's data). First, for some commodities the planned vs. actual hectarages come out surprisingly close in total but vary substantially from Mohafaza to Mohafaza. Second, for other commodities both the total planned and actual hectarages vary substantially from Mohafaza to Mohafaza.

This variation is not surprising. Planned vs. actual crop mix for a particular farm may change within the year, depending on both the amount and distribution of rainfall. The shifting crop-mix process will be discussed in detail later in this report. In addition, planned vs. actual hectarages vary because some farmers operate outside the licensing process. This is especially true for those farmers who do not have any irrigated land and those who are self-financed.

Production Planning

Although cropping patterns, production, and input utilization are generally planned in Syria, the discussion so far has focused on land utilization planning within the context of national production goals. Because of the variations in weather, it can be assumed that production planning is difficult and in any given year can deviate substantially from plans formulated at the beginning of the growing season.

It is also generally known that despite regulations relating to the use of inputs obtained via the licensing process, some farmers may shift usage of inputs (fertilizer, for example). The degree to which this is done is not known, though it is not unreasonable to assume that this may lead to a better allocation of resources under many circumstances.

The Agricultural Cooperative Bank

The Agricultural Cooperative Bank, with headquarters in Damascus, is a governmental organization affiliated with the Ministry of Economy and International Trade. This organization plays a critical role in providing farmers direct access to or loans for seed, fertilizer, and chemicals. In most cases,

obtaining a loan is contingent upon holding a license. (Details on the bank's policies and operations are given in another SASA report.)

The General Peasants' Union And Cooperatives

In addition to the General Peasants' Union, based in Damascus, there is a Peasants' Union structure in each Mohafaza. Each Mohafaza Peasants' Union consists of sections at the Mantika level, which in turn are made up of existing village cooperatives. Cooperatives came into being as a form of farm business organization under the Agrarian Reform Law of 1958. The law stipulated that farmers who obtained land from reform were to join cooperative organizations. Basically, the cooperatives are farming bodies in which individual farmers join to plan and carry out farm production on a mutual decision basis. Members obtain loans on a cooperative as opposed to an individual basis. One of the main ideas of the cooperative was to obtain machines and machine service as a group so as to achieve economies of scale even though each individual farm was small.

Peasants' Union organizations developed along with the creation and development of cooperatives. The General Peasants' Union has merged with the cooperative organizational structure and is now the regulating agency for cooperative affairs. Cooperatives do not exist in every village and not every farmer in a given village (except in special project areas) is a member of the cooperative. At times a cooperative is formed among several villages; all cooperatives belong to the Peasants' Union.

Cooperative organizations help with obtaining inputs and selling products. Loans can be obtained from the Agricultural Cooperative Bank at a 1.5 percent interest rate discount, fertilizer and seed are discounted 5 percent and cooperatives can buy machinery at discounts from governmental machinery marketing organizations. In some cases, private farmers can hire machinery from cooperatives. The cooperatives are also involved in marketing. All products marketed through cooperatives are priced at one piaster per kilogram above the government-established prices.

Cooperative marketing operations are supervised at both the local and national levels by the General Peasants' Union. At the cooperative level, production is gathered and transportation facilitated for delivery to public-sector marketing organizations. In the case of potatoes the Union has undertaken marketing at all stages. Some private farmers can also market their products through cooperatives. There are now approximately 3250 cooperatives, the majority of which are referred to as multi-purpose production cooperatives. Some are specialized for livestock breeding and husbandry. Within each cooperative a portion of the income from sales is kept to administrative officers such as accountants.

Wage Rates and Conditions of Employment

Wage rates and conditions of employment for hired farm labor come under the jurisdiction of the Ministry of Labor and Social Affairs. Wage rates

vary by Mohafazat and Mantika. Farm wages are based on the cost of living in the local area as well as the productivity expected from labor.

Regulations cover the number of work-days per year, per week, hours per day, vacation, housing standards, insurance benefits and wage rates for women and men. A more thorough discussion is presented in Appendix B.

Farm Lease Arrangements

The Ministry of Labor and Social Affairs sets guidelines for farm lease arrangements between landlords and tenants. Through an administrative proceed, recommendations for leasing provisions as well as cost and income sharing are set by Mohafaza. See Appendix C.

Input and Product Marketing and Pricing

The Supreme Agricultural Council (SAC) determines prices at which the government is willing to purchase commodities during the marketing season. The Council also sets prices for farm inputs such as seed, fertilizer and some animal feeds. When farm prices are announced, the same government decision confirms the obligation of certain state agencies to purchase the price-supported crops. Several government organizations and establishments have been set up to purchase major crops for set prices. This price-setting mechanism allows other public sector agencies to purchase major crops at the support prices.

Syrian agricultural price policy objectives are:

1. To provide necessary incentives for desired production,
2. Maintain a balance between farm and nonfarm incomes and provide for certain minimum agricultural income,
3. Maintain a stability of farm product and input prices (Akhrass, 1978).

Although all prices are set by law, the prevailing price system is generally made up of a set of fixed and semifixed prices. (Further details on products and input pricing and marketing processes are given in other SASA reports).

C. Farming Systems Criteria

This section of the report deals with background criteria for defining farm systems.

Agricultural Areas

Classification of agricultural areas of Syria into Stabilization Zones is based primarily on rainfall patterns. It is closely related to the nature of crops grown, crop rotation, land use proportions, and shifting among crops within a given time period. The five Stabilization Zones are

described in the annual volumes of the Statistical Abstracts, and in The Natural Resources Annex.

Major Commodity Classification

One could classify the various agricultural commodities grown in Syria in many possible ways depending upon the needs for analysis. The following classification is based on judgement in defining farming systems. Nearly all of the commodities for which data are presented in the 1977 Statistical Abstract are included in the commodity classification. Commodities excluded are of very minor economic importance. In the discussion of farm systems, reference will at times be made to specific commodities. In cases where a commodity group is mentioned it will be in the context of this classification.

1. Wheat)
) Cereals
2. Barley)

3. Dry Legumes

   Chickpeas
   Lentils
   Dry broad beans
   Dry kidney beans
   Dry haricot beans
   Peas
   Other

4. Cotton

5. Tobacco

6. Sugarbeet

   Summer
   Fall

7. Peanuts

8. Other Grains

   Millet
   Maize
   Sorghum
   Oats
   Chickling and bitter vetch
   Other

9. Other Oilseeds

   Sesame
   Sunflower
   Soybeans
   Other

10. Summer Vegetables

   Tomato
   Potato (fall and spring)
   Musk and water melon
   Eggplant
   Cucumber
   Dry onion
   Parsley
   Squash
   Green peppers
   Haricot beans
   Okra
   Pumpkins
   Green kidney beans

11. Winter Vegetables

   Cauliflower
   Cabbage
   Carrots
   Green onion
   Radish
   Spinach
   Squash (in costal area)
   Edible beans

11. Winter Vegetables (Cont'd)

Green peas
Lettuce
Broad beans
Leaf beets

12. Forage and Residues

Grasses
Legumes
Meadows
All other residues
(Specific forages)
- Pastoral barley
- Pastoral trefoil
- Pastoral rambling vetch
- Pastoral flowering sern
- Alfalfa
- Other

13. Fruit Trees

Subgroup A
Orange
Lemon
Other citrus
Loquats

13. Fruit Trees (Cont'd)

Subgroup B
Apricot
Plums
Green plums
Pomegranate
Other nuts
Peaches
Pears
Apples

Subgroup C
Olive
Fig
Grape
Almond
Pistachio
Cherries

Farm Size

The following section presents background information about farm size. A brief history of agrarian reform and its imposed size limits on agricultural holdings as well as figures relative to currently prevailing agricultural holdings will be given. These data are based on available secondary sources.

While there had been previous attempts to enact land-reform legislation, the first effective comprehensive land reform law in Syria was the Agrarian Reform Law No. 161 of 1958. Basically, this law enacted ceilings on land ownership and created a land reform agency whose purpose was to administer the law and distribute expropriated land among eligible farmers. Prior to 1958, one third of the country's agricultural land was owned and exploited by 3240 landlords representing 0.6 percent of the rural population. The Agrarian Reform Law of 1958 was amended several times, most recently in Legislative Decree No. 88 of June 23, 1963 (although there have been specific subsequent decrees regarding redistribution of State-owned land).

The provisions of Decree No.88 established ceilings on ownership of irrigated land (according to land quality, method of irrigation, and population density); fallow land planted to olive and pistachio trees (according to land quality and population density); and rainfed lands (aacording to average yearly rainfall).

Current land ownership ceilings are as follows:

1. Irrigated Land:

   15 ha in Ghuta (Damascus area)
   20 ha in coastal area
   25 ha in Btiha and surrounding area
   40 ha in irrigated areas with pumps
   50 ha in irrigated areas with pumps or any lifting devices (i.e. the Euphrates, Khabour)
   55 ha in areas irrigated from wells (i.e. Al-Hasakeh, Al-Rakka and Deir-Ez-Zor in northeast Syria)
   45 ha in the remaining areas where irrigation is practiced via pumps or any other lifting devices.

2. Rainfed fallow land planted to olive and pistchio trees (ten years old and over):

   35 ha in Lattakia province
   40 ha in remaining provinces

3. Rainfed land:

   80 ha in areas where the average annual rainfall exceeds 500 mm
   120 ha in areas where the range of rainfall is 350-500 mm
   200 ha in areas where the rainfall is less than 350 mm

   This ceiling has been raised to 300 ha in the Al-Hasakeh, Al-Rakka and Deir-Ez-Zor provinces.

The law and subsequent decrees granted the owner the right of selecting his parcel of land. However, it vested the right of selection within the land reform agency in cases of the rights of his immediate family where an additional 8 percent of the land was granted for every relative. The law granted corporation and cooperatives the rights of land ownership which would exceed the ceiling of individuals on the condition that the land be reclaimed.

In the case of the distribution of expropriated land, the law set 8 and 30 ha as limits in irrigated, treed areas and rainfed areas where average rainfall exceeds 350 mm; and 45 ha where the average annual rainfall is less than 350 mm. The law also stipulated several criteria for the beneficiaries of land reform. Their total land ownership was not to exceed

the legal limits. Family size and the ages of members were taken into consideration in setting the size of benefit within the framework of the legal ceilings.

In considering the actual distribution and economies of farm sizes today, it should be noted that, despite the legislation, the enforcement and administration of the law has at times been slow for technical and other reasons. It has been estimated that as of 1975, about 87 percent of the undistributed, expropriated land was in the Al-Hasakeh province. Consequently, some farming units exceed the legal limits particularly in the northeast. In some cases, quite large farming units continue because the land was split up among family members prior to the reform but is still farmed as a large unit today. The extent of this is unknown.

Redistributed irrigated land is believed to represent about 23 percent of the exploited, irrigated land while redistributed treed land represents about 4 percent of the areas in trees. Redistributed rainfed areas represents about 15 percent of the exploited rainfed areas in the country. It has been estimated that the average farm size for redistributed area irrigated or planted to trees varies between 2.5 and 3 hectares, with 15 to 20 hectares usual for rainfed areas (Al-Akhrass, 1978).

Aside from what is said above about the upper limits of farm size under agrarian reform, extensive data about farm size is lacking. Although data obtained in the 1970 Agricultural Census gives some general information about the size and distribution of farms, these data are not adequate for formulating farm enterprise budgets. More importantly, data relative to farm size are needed by type of farm, by major commodities, and for irrigated and nonirrigated farms. The farm survey which is to parallel this work is very important in this regard. General indications of size by type of farm will be discussed in later sections. The information were gathered from field trips, farm visits, and discussion with agricultural officials.

Degree of Mechanization

Although some quantitive data will be given here regarding farm machine numbers in use, the general discussion of the degree of mechanization in this report will be on a qualitative - descriptive basis. Some discussion of the mechanization will be given along with each farm system. Appendix D gives a more specific discussion of farm operations and how they are performed for major crops.

The following Figures show trends over the 1973-77 period, based on data from Statistical Abstracts.

1. There were 14,227 tractors of 50 horsepower or more in use in 1977, increase of 143 percent over 1973. Some Mohafazat showed substantially larger increases.

2. There were 6,445 tractors of less than 50 horsepower in use in 1977, an increase of 12 percent over 1973. Some Mohafazat showed substantial decreases.

3. The number of old plows in use in 1977 was 8 percent less than in 1973, but there were still 108,301 old plows in use. Only four Mohafazat showed increases.

4. The number of modern plows in use increased by 74 percent from 1973 to 1977, with 26,310 in use in 1977.

5. The number of seeders increased by 26 percent, 1973-1977, with 2087 in use in 1977.

6. The number of disk harrows and pulverizers increased by 75 percent to 2687 in 1977.

7. Dry pesticide applicators increased by 17 percent for those operated by hand, 38 percent for those powered by motor.

8. The number of liquid pesticide applicators in use increased by 28 percent and 55 percent respectively, for those operated by hand or powered by motor.

9. During the 1973-77 period the number of water-raising pumps increased 26 percent to 40,650.

10. The number of fixed harvesters and selfpropelled combines showed major increases of 86 percent and 42 percent, respectively. At the same time, the number of pull-type combines decreased by 14 percent.

11. The number of straight harvesters (whether powered by animal or tractor) had decreased to the point of insignificance in 1977.

Clearly, there was a major increase in machinery for tillage and harvesting. It is important to note that tractors of over 50 horsepower increased more than those under 50 horsepower. The shift to bigger tractors in also interesting in light of the 74 percent and 75 percent respective increases in modern plows and disk harrow and pulverizers because this also implies a shift to bigger tillage tools. Bigger tractors and tillage tools are also noteworthy in view of the increase in self-propelled combines and fixed harvesters.

These figures, along with casual observation, seem to indicate strong increases in mechanization for the crops potentially mechanizable, primarily cereals and grains. The exceptions are small plots and rocky areas. Farmers generally indicated that machine service for cereals and grain harvesting was available either through the cooperatives or by hire from private machine owners. Most farmers questioned indicated that they paid 8-10 percent of the crop for hired cereals harvesting, with the range being from 6 percent to 16 percent.

Farmers questioned indicated a general availability of machine services for most crops for the tillage operations up to seeding either through cooperatives or private sources. Beyond seedbed preparation stage, however, the degree of mechanization becomes quite variable, depending upon the nature of the crop. Even though machine services are more generally used for many crops, a large number of farms use animal power for basic tillage and other operations. This is reinforced by the relatively small decrease (8 percent in the number of old plows in use between 1973 and 1977. The farms on which animal power still prevails are small farms, farms with stony fields, farms with steep slopes, farms where vegetables are major crops, and orchard farms.

Intensification Rates and Rotation Cycles

Intensification Rates

Intensification rate is a commonly used term that shows the degree of land use for cropping in Syria. Generally the intensification rate represents a calculated ratio of the number of hectares planted in crops per year to the total number of cultivated hectares (fallow + nonirrigated and irrigated cropland). Two examples:

Extensive Farm

Given: 150 hectares of cultivated land
Each year: 100 hectares of fallow
30 hectares of barley
20 hectares of dry legumes

$$\text{I.R.} = \frac{\text{30 hectares of barley + 20 hectares of dry legumes}}{\text{100 hectares fallow + 50 hectares nonirrigated land planted in crops}}$$

$$= \frac{50}{150} = .33$$

Intensive Farm

Given: 10 hectares of cultivated land
Each year: 5 hectares of wheat
5 hectares of cotton
2 hectares of other crops

$$\text{I.R.} = \frac{\text{5 hectares wheat + 5 hectares cotton + 2 hectares crops}}{\text{10 hectares irrigated land planted to crops}}$$

$$= \frac{12}{10} = 1.20$$

The intensification rate will naturally depend upon many factors such as rainfall or water supply, soil fertility, climate, topography, etc. However, the key factor in Syria is water. Where fallowing is necessary the intensification rate obviously falls below 100 percent. On the other hand, with irrigation, where double or triple cropping or various combinations of intercropping are possible the intensification rate may reach 200 percent or better in some cases. Generally, on nonirrigated land the intensification rates do not exceed 100 percent, but such a rate can be achieved in the first stabilization zone. The rates for irrigated land vary depending upon the type of irrigation and source of irrigation water.

Crop Rotation

Crop rotation generally refers to a sequence of land uses, such as a set of crops and/or fallow, for a given parcel of land. It may extend for a number or portion of years. Rotation for nonirrigated land generally varies by stabilization zone. The following chart approximates rotation schedules:

	Period of Years		
Stabilization Zone	Cropped	Fallow	Total
IA	1	0	1
IB	2	1	3
II (good fertility)	2	1	3
II (medium fertility)	1 or 2	1 or 2	3
III	1 or 2	1 or 2	3
IV	1	2	3

D. Farming Systems Delineated

This discussion of farming systems in Syria will focus on those existing according to the following categories: cropping systems, orchard systems, and vegetables.

Cropping Systems

Where nonirrigated cropland that isn't planted to trees or vegetables exists, one will probably find some combination of cereals, dry legumes, and other crops grown. Intensification rates and the land-use proportion of these crops vary according to stabilization zones. Based on visits with agricultural officials and review of planning figures, some approximated data in this regard is presented below.

Intensification Rates and Land-Use Proportions by Stabilization Zones for Nonirrigated Cereals, Dry Legumes, and Other Crops

Stabilization Zone	Percent Planted in Crops	Percent Fallow
I	100	0
	43 wheat 7 barley 23 dry legumes 27 other	
II (more fertile)	68	32
	45 wheat 8 barley 10 dry legumes 5 other	
II (medium fertile)	60	40
	12 wheat 37 barley 9 dry legumes 2 other	
III	50	50
	5 wheat 42 barley 3 dry legumes 0 other	
IV (central and south)	33 barley	67 fallow
(north and northeast)	33 barley	33 secondary fallow 33 fallow

As the table shows, the percent of cultivated and fallow land and land-use proportions within the cultivated land vary according to stabilization zone. However, the same intensification rates tend to prevail where throughout a stabilization zone nonirrigated land is planted in cereals, dry legumes, and other crops. Generally, for example, throughout the more fertile part of Stabilization Zone II, the intensification rate will be 68 percent (68 percent cultivated and 32 percent fallow). Moreover, the cultivated area planted to each crop would probably be 45 percent wheat, 8 percent barley, 10 percent dry legumes, and 5 percent other crops.

It is interesting to note how the cropping pattern changes. From Zone I to Zone IV the percentage of wheat decreases relative to barley (wheat disappears entirely in Zone IV). Dry legumes and other crops decrease and the nature of the other crops also changes.

There may be a shifting of land-use proportions within a particular year depending upon the distribution of rainfall. Consider, for example, the Dar'a Mohafaza. If sufficient rainfall occurs in late October or early November, farmers may plant their originally intended hectarages of wheat and barley. However, if rains during that season are not good, farmers may plant less wheat and barley than originally intended. If the rainfall is good in early January, farmers may there plant their originally intended hectarages of dry legumes as well as planting some of the land previously diverted from wheat and barley for dry legumes.

CROPPING SYSTEM 1

Title: Cereals, dry legumes, other crops (nonirrigated, Stabilization Zone IB)

Major Crops: Wheat, lentils, chickpeas, tomato, melon

Minor Crops: Barley, other dry legumes, other grains, other oilseeds, other summer vegetables, forages

Intensification Rate: 100%

Land Use Proportion: 43% wheat, 8% barley, 23% dry legumes, 26% other crops

Length of Crop Rotation: 2 or 3 years

Major Production Regions: Al-Hasakeh, Aleppo, Al-Rakka, Hama, Homs (These crops grown in some quantity in all other regions).

Farm Size: Smaller: < 20 ha/farm
Larger : > 20 ha/farm

This system is commonly found on nonirrigated land in Stabilization Zone I). Major production areas are in the northcentral and northeastern portions of the zone. The major crops are wheat, lentils, chickpeas and summer vegetables, primarily tomatoes, cucumbers, and melons. Some Mexican wheat as opposed to local wheat is grown in the north central, north, and northeast mohafazat. Lentils and chickpeas are important dry legumes, with chickpeas important in the southern provinces and lentils in north, northcentral and northeastern mohafazat. Nonirrigated tomatoes are important in Aleppo and Lattakia, melon in Aleppo, Idleb and Al-Hasakeh. Some nonirrigated maize, potato, cucumber, and cotton is grown in this zone. The other crop category includes some forages for livestock.

The majority of the farms in this zone are less than 20 hectares; this size farm occurs throughout the zone but units greater than 20 hectares tend to be in the north and northeast.

In some small or rocky areas, seedbed preparation is done by hand labor. In general, however, seedbed preparation is by machine (either from a co-operative, hired or owned) for most of the crops in this system. A variety of seeding methods are used for cereals with machinery employed on large hectarages. Most weed control is by hand except in larger cereal-growing areas. Where the hectarages are small, most of the cereal harvest is by a combination of hand labor and stationary harvesters. Most of the seeding and cultivation for dry legumes is by small machines or hand labor; harvest is generally by hand labor. For summer vegetables, most of the production operations are completed by hand labor except for seedbed preparation and some seeding.

CROPPING SYSTEM 2

Title: Cereals, dry legumes, other crops (nonirrigated, Stabilization Zone II, more fertile)

Major Crops: Wheat, barley, lentils, chickpeas, and summer vegetables

Minor Crops: Other dry legumes, other grains, other oilseeds, other summer vegetables, forages

Intensification Rate: 60%

Land Use Proportion: 45% wheat, 7% barley, 10% dry legumes, 6% other crops, 32% fallow

Length of Crop Rotation: 3 years

Major Production Regions: Al-Hasakeh, Aleppo, Al-Rakka, Hama, Homs (These crops grown in some quantity in all other regions)

Farm Size: Smaller < 25 ha/farm
Larger > 25 ha/farm

This system consists of nonirrigated land in the second Stablization Zone that would generally be considered more fertile. Wheat is grown in about the same percentage as Zone I but the varieties are mainly local as opposed to Mexican. Lentils and chickpeas are important dry legumes with chickpeas more important in the southern mohafazat and lentils predominant in the north central, and northeastern mohafazat. The other crop category becomes small. Any summer crops that are grown tend to be those tolerant of drier weather such as sesame or sorghum.

The heavier production areas are located in the north central, north, and northeast. Many of the farms are smaller than 25 ha. Those of the larger size are generally found in the north and northeast. The machinery situation is similar to that found in Cropping System 1.

CROPPING SYSTEM 3

Title: Cereals, dry legumes, other crops (nonirrigated, Stabilization Zone II, medium fertile)

Major Crops: Wheat, barley, dry legumes, other grains

Minor Crops: Other dry legumes, and oilseeds

Intensification Rate: 60%

Land Use Proportion: 12% wheat, 37% barley, 9% dry legumes, 2% other crops, 40% fallow

Length of Crop Rotation: 3 years

Major Regions: Al-Hasakeh, Aleppo, Al-Rakka, (Some of these crops are grown in all other regions within this zone)

Farm Size: Smaller < 35 ha/farm
Larger > 35 ha/farm

This system consists of nonirrigated land of medium fertility in the Second Stabilization Zone. The amount of wheat grown decreases substantially compared with Cropping System 2 while the amount of barley increases. Production is more concentrated in the eastern part of the zone. The percentage of dry legumes remains nearly the same as in more fertile parts of Zone II. Other crops nearly disappear.

Information about farm size is very sketchy and figures are only approximations. There tends to be more mechanization because of the larger farm sizes, but the machinery situation is still similar to Crop System 1.

CROPPING SYSTEM 4

Title: Cereals, dry legumes, other crops (nonirrigated, Stabilization Zone III)

Major Crops: Wheat, barley, dry legumes

Minor Crops: Very few

Intensification Rate: 50%

Land Use Proportion: 5% wheat, 42% barley, 3% dry legumes, 0% other, 50% fallow

Length of Crop Rotation: 3 years

Major Region: Al-Hasakeh, Al-Rakka, Aleppo (Some of these crops are grown in all regions having nonirrigated, Zone III land).

Farm Size: 50-150 ha/farm

This system consists of nonirrigated land in Stabilization Zone III. A small amount of wheat is grown around Hama and Aleppo although it isn't licensed. The basic crop here is barley, with production concentrated in Al-Rakka and Al-Hasakeh.

Generally the crop rotation is three years, although barley may be sowed two years in a row if rainfall is good, with grain production expected. It may also be planted two years in succession with the intention of grazing only. Dry legumes area grown in this zone occur in the southern area near Al-Sweida or Damascus rather than in the north.

Farms are quite large although specific figures are uncertain. In some cases these large units are owned by landlords who have the land farmed on a crop-share basis or the landlord may furnish all inputs and use hired labor. In other cases, large contract farmers combine the land of several smaller owners, furnishing machinery and certain inputs. The owner keeps a part of the crop in return for providing land and some materials. Barley seedbed preparation, seeding, weed control, and harvesting is completed almost entirely by machinery in this zone.

CROPPING SYSTEM 5

Title: Cereals, dry legumes, other crops (nonirrigated, Stabilization Zone IV)

Major Crop: Barley

Minor Crops: None

Intensification Rate: 33%
Note: In the northeast, because of proximity to large livestock grazing and production areas, one third of this land that would otherwise be fallowed may be sown to barley for grazing. Such land is referred to as secondary fallow.

Land Use Proportion: 33% barley, 67% fallow

Length of Crop Rotation: 3 years

Major Regions: Al-Hasakeh, Al-Rakka, Aleppo

Farm Size: > 150 ha/farm

This system consists of nonirrigated land in Stabilization Zone IV. The production area is concentrated in Al-Hasakeh and Al-Rakka. Although the land is generally planted to barley every third year for grain, barley is at times sown for grazing. As with System 4 the farm size is unknown. Farm organization and machinery use generally the same as in System 4.

CROPPING SYSTEM 6

Title: Cotton, sugar beets, cereals, other (irrigated)

Major Crops: Cotton, sugar beets, Mexican wheat

Minor Crops: Corn, sunflower, melon, some dry legumes, some other grains and oilseeds, summer and winter vegetables, forages

Intensification Rate: 100-140% depending upon location and method of irrigation

Major Regions: Hama (including Ghab), Homs, Idleb, Damascus

Farm Size: 2-5 ha/farm

This system consists of irrigated land primarily planted to cotton, sugar beets, and Mexican wheat. Other crops are grown at times, including corn and sunflower. The intensification rate varies according to the type of irrigation, the natural rainfall available, and other conditions. The major production regions are Hama (including the Ghab region), Homs, Idleb, and Damascus. In Damascus the major crops may be combined with vegetables. For example, one will find wheat, tomatoes or cotton, potatoes, etc. In general vegetables come in as other crops when this system is found near major cities.

Much of this land is in special government projects and is irrigated with the result that farm size is small. Farms are also small because of the concentration of labor-intensive crops. The degree of mechanization is limited by the nature of the crops, the size of farms, and the fact that the land is irrigated. Irrigated land often has to be divided by series of ditches and ridges to regulate water flow, which makes machine use difficult for some operations. Much of the deep plowing and seedbed preparation is completed by machinery, with the balance of the seeding, cultivation, and harvesting done mostly by hand, for wheat.

CROPPING SYSTEM 7

Title: Cotton, cereals, other (irrigated)

Major Crops: Cotton, Mexican wheat

Minor Crops: Some dry legumes, sugar beets, other grains, other oilseeds, forages

Intensification Rate: 100-145% depending upon location and method of irrigation

Major Regions: Aleppo, Al-Hasakeh, Al-Rakka, Deir-Ez-Zor

Farm Size: 3-7 ha/farm

General Description

This system consists of irrigated land primarily planted to cotton and Mexican wheat. Other crops grown are sesame, vegetables, some sugar beets, corn.

The intensification rate varies according to the type of irrigation, natural rainfall, and other conditions.

Since the major production regions include Aleppo, Al-Hasakeh, Al-Rakka, and Deir-Ez-Zor this system largely occurs along rivers in the northeast including the Euphrates, Al-Khabour, Al-Balikh and Queiq rivers.

Again (as in System 6), since much of this land occurs in special government projects and is irrigated, the farm size is small. In additional farms are smaller owing to the intensity of farming and nature of the crops. Overall, average farms in this system may be slightly larger than those discussed in System 6. The machinery situation is similar to System 6.

CROPPING SYSTEM 8

Title: Peanuts, tobacco, vegetables (irrigated and nonirrigated)

Major Crops: Peanuts, tobacco, vegetables (winter and summer)

Minor Crops: Other grains, forages, some cereals, a few dry legumes

Intensification Rate: Variable, but quite high because these crops are grown in high rainfall areas and there is some irrigation

Major Regions: Tartous, Lattakia, Homs

Farm Size: .5-3 ha/farm typical; some have 5 or 6 ha

This system consists of farms in the northwest part of Syria with some land that is irrigated and some that is not. The principal crops are peanuts, tobacco and vegetables. Although many different vegetables are grown, the two more important ones are tomatoes and cucumbers. In the very southern part of this area, corn is sometimes important. Some cereals and dry legumes are grown. Forages are scattered throughout the area for livestock.

The principal Mohafazat involved are Tartous, Lattakia and Homs (often referred to as the coastal plain). More of the peanuts are grown in the southern part of the region (Tartous, Homs and southern Lattakia Mohafazat) whereas the proportion of tobacco increase around Lattakia. However, in both sections, peanuts and tobacco are ordinarily grown in combination as opposed to being on specialized farms. The vegetables tend to be grown on the more fertile land and near villages, whereas the peanuts and tobacco are grown in fields farther from the villages. All of the peanuts are irrigated; some of the vegetables are nonirrigated and others are irrigated. Most of the tobacco is nonirrigated. However, the tobacco that is irrigated tends to be American flue-cured and burley types grown in the southern part of the region.

Because of the demand for land and the nature of the crops grown, the farms are generally small (0.5-3 ha/farm). Farms which grow irrigated tobacco tend to have 1 ha in tobacco. On nonirrigated farms raising tobacco, the amount varies from 1 to 20 dunomes. Farms growing peanuts have 2-10 dunomes planted in that crop. Mechanization beyond that for seedbed preparation is minimal outside of irrigation equipment. Most operations are quite labor intensive.

CROPPING SYSTEM 9

Title: Tobacco and vegetables (nonirrigated)

Major Crops: Tobacco, summer and winter vegetables

Minor Crops: Some cereals, some dry legumes, some forages

Intensification Rate: Likely to be near 100% because the area has fairly high natural rainfall.

Major Regions: Lattakia, Idleb and parts of Tartous Mohafazat

Farm Size: 2-4 ha/farm typical (0.5-8 ha/farm range)

This system of farming tends to occur in the hilly regions to the east and north of the coastal plain. The primary crops are tobacco (air-cured oriental and semioriental types) and vegetables (tomatoes, cucumbers, other). Although these farms are generally nonirrigated, some small areas of vegetables may be irrigated where water sources are available. At times the tobacco may be irrigated on a supplementary basis. These farms may also have some olive and grape orchards.

Mechanization is minimal, though some seedbed preparation is done by hired machinery; much of the tillage is performed by combinations of labor and animal power.

CROPPING SYSTEM 10

Title: Tobacco, other crops (nonirrigated)

Major Crop: Tobacco

Minor Crops: Some vegetables, cereals, dry legumes, forages

Intensification Rate: Variable

Major Regions: Lattakia, Idleb

Farm Size: 0.5-3 ha/farm typical

This system of farming tends to occur in the mountain regions of the Lattakia and Idleb Mohafazat. These farms are not very prosperous. Where sufficient level plots of land exist, tobacco is grown. Other crops is varying amounts include cereals (particularly), a very few dry legumes, summer vegetables on small plots and forages.

Because of topography, small farm size, small field size, and irregularly shaped fields, machine usage is minimal. The machinery that is used is usually hired. Basically, animal power and labor are used.

Orchard Systems

The four main factors to be considered in identifying Orchard Systems are elevation, rainfall, slope, and soil type.

Elevation. Although many types of fruit trees are grown throughout Syria, in the areas where fruit tree production is most prevalent the types tend to be concentrated at certain elevation levels. The following table shows the breakdown of the major types of trees according to elevations:

less than 200 m	200 m - 600 m	greater than 600 m
Orange	Apricot	Pears
Lemon	Peaches	Peaches
Other citrus	Plums	Apples
Loquats	Green plums	Cherries
	Fig	Almond
	Pomegranate	Pistachio
	Almond	
	Pistachio	
	Other nuts	
Olive	Olive	
Grape	Grape	Grape

Rainfall. Where some fruit tree types are grown in substantial numbers on both irrigated and nonirrigated land, the irrigated trees will generally be in areas where the rainfall is less than 200-250 mm per year. In turn, those that are nonirrigated will be grown in rainfall areas of over 200-250 mm/year. Both irrigated and nonirrigated trees will be in the same elevation range.

Slope. On a planning basis, it is intended that trees will be grown in areas where the slope is greater than 12 percent. To a large extent the nonirrigated trees and some of the irrigated trees do occur at these slopes. It is known, however, that some of the irrigated fruit-tree land occurs on slopes less than 12 percent.

Soil Type. Two important factors related to soil type for fruit-tree production are soil depth and calcium content. Generally, olive, fig, almond, and pistachio are more adapted to shallower soils. The other fruit trees are grown on moderate to deep soils. Olive, fig, almond, and pistachio are grown in soils of greater than 10 percent active calcium content. The other fruit trees tend to occur on soils with a lower percentage of active calcium.

ORCHARD SYSTEM 1

Title: Fruit trees - subgroup A (Irrigated)

Major Tree Crops: Orange, lemon, other citrus, loquat

Minor Crops: Some forages and vegetables intercropped during seedling years; other crops in small areas not in trees

Elevation Range: Less than 200 m

Major Regions: Lattakia, Tartous, Homs

Farm Size: 0.5-3.0 ha/farm; a few larger

This system consists of the specialized citrus production area located in the coastal plain, including the Lattakia, Tartous and Homs Mohafazat. The main citrus crops are orange and lemon. Other crops as well as forages and vegetables may be grown in small areas not in orchards on these farms.

The typical size of farm ranges between 0.5 and 3.0 ha, with 60-70 percent of the farms falling into this size range. Machine use is largely limited to cultivation, spraying and transportation. Most other operations are done by hand labor. In some cases, the crop is sold on the tree and the harvest labor is furnished by the purchaser.

ORCHARD SYSTEM 2

Title: Fruit trees, subgroup B (substantially irrigated - partially nonirrigated)

Major Trees Crops: Apricot, plum, green plum, pomegranate, other nuts, peach, pear, apple

Minor Crops: Vegetables, forages, cereals, and other crops (intercropped in irrigated areas, especially in winter; intercropped in nonirrigated areas in seedling years)

Elevation Range: 200-600m (apricot, plums, green plums, pomegranates, other nuts)

over 600m (peaches, pears, apples, some peaches at 200-600m)

Soil Depth: Moderate to deep

Soil Active Calcium Content: Less than 10 percent

Major Regions: Damascus, Lattakia, Idleb, Tartous, Homs (certain trees are important in other, scattered areas).

Farm Size: Irrigated: 0.5-1.5 ha/farm typical; some are larger
Nonirrigated: Mainly 2-4 ha/farm

This system consists of a fruit tree group including apricot, plum, green plum, pomegranate, other nut trees, peach, pear, and apple. All of these tree crops are substantially irrigated - 65 percent or more of each is irrigated with the exception of apple trees, of which 52 percent are irrigated. In general those trees that are irrigated tend to be grown in areas where the average annual rainfall is less than 200-250mm.

Apricot, plum, green plum, pomegranate, and other nut trees tend to be concentrated in the 200-600m elevation range. Peach, pear, and apple trees generally occur at elevations above 600m, with some peach trees occurring in the 200-600m range. The trees are generally found in moderate-to-deep soils where the soil active calcium content is less than 10 percent.

When these tree crops are irrigated, the intensification rate becomes quite high because many vegetables, forages, cereals and other crops are intercropped with the trees, especially during the winter. This is particularly true around Damascus. Many of the vegetables are for commercial sale, whereas the forages are fed to domestic livestock. In the nonirrigated areas intercropping generally only occurs in the seedling years.

Mechanized operations tend to be limited to fertilizing, cultivation, irrigation, spraying, and transporting. Other operations are largely completed by labor.

ORCHARD SYSTEM 3

Title: Fruit trees, subgroup C (nearly all nonirrigated)

Major Tree Crops: Olive, fig, grape, almond, pistachio, cherry

Minor Crops: Vegetables, forages, cereals, other crops. These are not generally intercropped with the trees except in the seedling years, but are grown on areas within the farm not planted to trees.

Elevation Range: 200-600m (olive, fig, grape, almond, with some olive and grape below 200m and some grape and almond above 600m).

Over 600m (pistachio, cherries, with some pistachio in the 200-600m range. Pistachio grows best in the 600-800m range).

Soil Depth: Shallow

Soil Active Calcium Content: Greater than 10 percent

Major Regions: Aleppo, Idleb, Damascus, Homs, Tartous, Lattakia, Al-Sweida, Hama. The relative rank of each type of tree will vary within each of these regions.

Farm Size: 2 or 2.5 ha - 4 or 5 ha/farm

This system consists of a fruit tree group including olive, fig, grape, almond, pistachio, and cherry. These tree crops are almost entirely non-irrigated. A few are irrigated where the average rainfall falls below 200-250mm year. Irrigated olives around Damascus are one example.

Olive, fig, grape, and almond trees tend to be concentrated in the 200-600mm range, with some olive and grape grown below 200m and some grape and almond above 600m. Pistachio and cherry tree production in mainly above 600m, with pistachio best adapted to 600-800m, even though some are grown in the 200-600m range. These trees are generally more adapted to and found in shallow soils where the soil active calcium content is greater than 10 percent, though grape is sometimes an exceptions.

In some cases these trees are found in mixed stand such as olive and grape; olive, fig, grape; and live, fig, grape, cherry. The purpose of this is to obtain some income from short-maturity trees like grape while the olive trees are approaching the productive years. The farmers also say they use this method to level out the year-to-year variation in olive production.

As in the case of Orchard System 2, the intensification rate in the limited irrigated area is quite high because of intercropping especially during the winter.

The major areas of production for these tree crops are Aleppo, Idleb, Damascus, Homs, Tartous, Lattakia, Al-Sweida, and Hama. The relative importance for each type of tree varies within each of the regions. These farms range in size from 2-2.5 ha - 4 or 5 ha/farm. The few irrigated farms are smaller but are much more intensely cropped.

A limited number of the production operations are mechanized. However, some cultivation, spraying, and most transporting of product is done by machinery. In many areas animal power is used extensively for cultivation but other operations are basically by hand labor.

Vegetable System

One system for vegetable production will be presented here. This system deals with those farms that tend to specialize in vegetable production. It should be understood that this classification is not absolute because even on these farms, other tree or field crops are often grown.

VEGETABLE SYSTEM 1

Title: Summer and winter vegetables and other crops - specialized (mainly irrigated)

Major Crops: Summer and winter vegetables (see commodity classification)

Other Crops: Forages, fruit trees, other

Major Regions: Damascus, Homs, Hama, Aleppo, Tartous, Lattakia, near all other important cities and villages

Intensification Rate: Quite high, 200% or better in many places, due to the fact that the land is intensely cultivated, highly fertilized, usually irrigated, and the growing season for many types of vegetables is short.

Farm Size: Difficult to estimate. Many farms are 5-15 dunomes, in some areas as large as 25-40 dunomes per farm.

These intensively cultivated farms, specializing in vegetable production, are in areas surrounding cities or where certain specific soil and water availability characteristics exist.

Fresh vegetables are widely consumed in Syrian cities, which provide markets at minimal transportation cost for both farmer and consumer. The desire for fresh produce from nearby farmers does, however, strongly influence the industry's degree of development in handling and processing vegetables.

Some specialized vegetable production farms occur in areas relatively removed from cities. This is often due to such specific factors as soil characteristics, topography, and the availability of water (either natural or from irrigated sources). These farms tend to specialize in certain kinds of vegetables such as potatoes or tomatoes; vegetable farms near cities generally produce a broader variety of vegetables.

It should also be realized that even though vegetables may be the major crop, these farms often have some other crops, including forages and fruit trees.

The mechanization situation is also difficult to evaluate. In the case of seedbed preparation, much of the primary tillage is done by machinery (usually on a hired basis), though animal power is also widely used. Beyond seedbed preparation, most of the operations are by labor or by labor with the assistance of animal power. Traditional types of machinery would be difficult to use on many of the small farms where plots are often in a continuous state of intercropping.

Animal power on vegetable farms fits into the small farm context because many of the farmers market their products directly to consumers, using the animals to transport much of the produce. However, some farmers either own or hire small pickups or motorized carts to deliver produce.

Comments

Although the previously discussed systems of farming have been delineated and described, it is readily admitted that this discussion has many shortcomings and lacks completeness in several regards. Some factors not fully detailed are:

Farm size. The discussion of farm size here has been based on limited data and a great deal of estimation replanting field discussions and observations.

Irrigated and Nonirrigated combination. This discussion also does not indicate the typical proportions of irrigated and nonirrigated land on farms having both. This information would be important in developing farm enterprise budgets for the systems described here. Some farms visited did have combinations and in these cases the amounts of irrigated land generally ranged from 0.5 to 3 ha, the nonirrigated land ranged from 2 to 6 ha, giving a total farm size range of 2.5 - 9 ha/farm. However, it was impossible to generalize about the whole nation.

Farms with combinations of systems. Many farms do not fit any of the systems described but incorporate combinations of several systems. However, it was not possible to determine the extent or generalize about the nature and location of these farms beyond the very general comments made within the description of each system.

Degree of mechanization. Although mechanization has been mentioned extensively here, the treatment has been fairly superficial. More analysis about the degree of mechanization is needed. Ahtough most of the machine services acquired by individual farmers are either by hiring or through cooperatives, it is important to evaluate the economics of machine ownership in Syria in the context of farm size and a given farm system.

Farm business organization. Although agriculture production in Syria is organized within the context of private farms, multipurpose farm production cooperatives, and state farms, it was not possible to evaluate these farms or farm business organization as they relate to farm systems. In some contexts the type of farm business organization can be a distinshing factor between farm systems.

Farm tenure. This study did not attempt to distinguish farm systems on the basis of tenure. On the farms visited, the majority of the farmers were holders either as owners or recipients of Agrarian Reform Law land. Where some form of leasing occurs there are many variations. This is considered briefly in the farm systems discussion. Some general comments about governmental rules for farm lease arrangements are provided in section B and Appendix C.

Livestock. This paper does not detail the livestock systems. It should be considered that nearly every farm has some livestock whose products are used for household consumption. This livestock compliment may include five or ten chickens, three to eight sheep or goats, and one or two cows. Commercial livestock production, fisheries and forestry will be covered by other parts of the Syrian Agriculture Sector Assessment.

E. Other Considerations

In this study and other parts of the Syrian Agriculture Sector Assessment it is important that farm income and farm enterprise cost budgets be developed for the major crops and farming systems. Particular attention should be paid to farm size. Such budgets could provide a basis for evaluative farm management studies of alternative crop patterns and resource use. More thorough data on farm income and farm enterprise cost is necessary to make adequate agricultural policy decisions.

One of the major issues in Syrian agriculture is related to intensification. Is it better to work toward labor-intensive crops or in the direction of mechanizable crops? To support such a decision number of factors must be considered:

1. What are the physical and biological possibilities of introducing other crops into traditional rotations?

2. What are the mechanization possibilities and limitations for new crops?

3. What is the nature of the labor supply and what is the wage-rate structure?

4. What are the capital requirements within the context of farm size related to more intensive resource uses?

All costs (not just revenues) must be considered when developing intensification policies. If wage rates are high and if the levels of underemployment and unemployment are low, then intensification in the direction of mechanizable crops is indicated. On the other hand, if wage rates are relatively low and the labor supply is either abundant or fixed in agriculture, then the intensification direction might be toward labor-intensive crops. The above points also tie in with the issue of intensifying rotations in rainfed lands with forages, along with more complete integration of livestock into the village farm structure. If the long-range productivity of the Steppe grazing lands continues to decline (as has been reported) and if crop rotations traditionally involving cereals can be intensified with forages (assuming biological, physical, and economic feasibility), then livestock will tend to become more integrated into the village farm structure. The possibilities of this need to be carefully studied.

Much of the above discussion has centered around production economics. It is also important to emphasize the value of good production research. Once water and cultivable land resources are relatively fully utilized, the possibilities of increasing farm production rest upon such factors as: development of improved crop varieties and improved types of livestock; development of improved and adapted machinery; development of many other improved cultural practices; availability of credit and other inputs at reasonable prices; and continued improvement of farmers' management abilities via training based on good basic and applied research.

Many good production research efforts are now going on in Syria, including:

1. The FAO Integrated Agriculture Development Project: growing vegetables under plastic; developing improved, disease-resistant strains of orchard trees; adapting forage into traditional dryland farming rotations;

2. The International Center for Agricultural Research in the Dry Area: experimenting with more intensive rotations on dry lands;

3. The Ministry of Agriculture and Agrarian Reform and related agencies such as the Cotton Bureau, the Seed Multiplication Establishment;

4. The 19 state farms under direction of the Ministry of Agriculture and Agrarian Reform as well as those under the jurisdiction of other Ministries related to agriculture.

The importance of these and other research projects cannot be over emphasized. At the same time it must be stressed that the economic aspects of these research activities (applied to actual farm conditions) need to be fully studied. For example, what are the economics of vegetables production under plastic for typical farm or farm cooperative conditions?

Besides the issues of production research and production economic research, these other issues need to be mentioned:

1. The cooperative as a form of farm business organization should not be taken for granted. The question of whether other forms of farm business organization are better needs to be considered. Cooperatives have facilitated the more general utilization of fertilizer and to some extent the adoption of improved seeds. However, based on observation, it appears that machine services are more cheaply and readily obtainable through the private structure rather than through cooperatives.

2. Consideration needs to be given to those farms operating outside the licensing process. How extensive are they? Can they obtain adequate credit as well as other input and product marketing services compared to the cooperatives? Under current farm price and income policies, who is more subsidized, the private or cooperative farmer?

APPENDIX 1

Planned vs. Actually Planted Hectarages of Major Crops, SAR, 1976-1977

	Irrigated Cotton			Nonirrigated Cotton			Irrigated Summer Sugar Beet		
Mohafazat	Plan	Actual	Actual Plan %	Plan	Actual	Actual Plan %	Plan	Actual	Actual Plan %
Damascus City	-	-	-	-	-	-	-	-	-
Damascus	2,640	2,713	103	-	-	-	1,800	1,437	80
Homs	5,059	4,514	89	390	188	48	1,210	1,040	85
Hama	8,151	8,059	99	1,336	1,468	109	-	118	-
Al-Ghab	24,675	20,960	85	496	393	79	618	240	38
Aleppo	28,670	30,810	107	3,330	4,799	144	-	436	-
Idleb	3,732	5,131	137	6,688	3,375	50	390	72	18
Lattakia	-	-	-	-	-	-	-	-	-
Tartous	-	-	-	-	-	-	-	-	-
Al-Rakka	28,950	29,225	101	-	-	-	-	2,928+	-
Deir-Ez-Zor	39,825	38,455	96	-	-	-	-	-	-
Al-Hasakeh	34,868	36,417	104	-	-	-	-	-	-
Dar'a	-	-	-	-	-	-	-	-	-
Al-Sweida	-	-	-	-	-	-	-	-	-
Quneitra	-	-	-	-	-	-	-	-	-
TOTAL	176,570	176,284	99%	12,240	10,223	83%	4,018	6,316	157%

+ Includes Euphrates

APPENDIX 1 (CONT'D)

Mohafazat	Irrigated Fall Sugar Beet Plan	Actual	Actual Plan %	Nonirrigated Lentils Plan	Actual	Actual Plan %	Nonirrigated Chickpeas Plan	Actual	Actual Plan %
Damascus City	-	-	-	-	-	-	-	-	-
Damascus	-	-	-	1,940	1,438	74	2,570	3,543	137
Homs	2,700	2,617	97	6,988	6,603	94	1,633	553	34
Hama	322	253	78	11,298	11,262	99	1,460	1,458	99
Al-Ghab	925	966+	104	1,850	2,026	109	946	28	2
Aleppo	-	-	-	40,910	55,124	134	8,320	2,868	34
Idleb	283	175	61	20,953	29,158	139	6,687	1,993	29
Lattakia	-	-	-	740	745	100	740	468	63
Tartous	-	-	-	600	705	117	2,230	2,321	104
Al-Rakka	-	-	-	-	125	-	-	-	-
Deir-Ez-Zor	-	-	-	-	-	-	-	-	-
Al-Hasakeh	-	-	-	89,363	46,682	52	2,575	106	4
Dar'a	-	-	-	9,480	14,191	149	2,720	19,425	714
Al-Sweida	-	-	-	5,415	3,766	69	13,695	5,563	40
Queneitra	-	-	-	50	50	100	2,675	2,675	100
TOTAL	4,230	4,011	94%	189,587	171,875	90%	64,251	41,001	63%

+ Al-Ghab also has 1375 Nonirrigated (Plan)
1368 Nonirrigated (Actual)

APPENDIX 1 (CONT'D)

Mohafazat	Nonirrigated Mexican Wheat Plan	Nonirrigated Mexican Wheat Actual	Actual Plan %	Nonirrigated Other Wheat Plan	Nonirrigated Other Wheat Actual	Actual Plan %	Nonirrigated Barley Plan	Nonirrigated Barley Actual	Actual Plan %
Damascus City	-	-	-	-	-	-	-	-	-
Damascus	-	-	-	11,500	16,979	147	22,800	16,431	72
Homs	2,088	1,018	48	69,035	72,260	104	67,652	55,689	82
Hama	5,625	6,609	117	59,133	78,124	132	95,221	83,549	87
Al-Ghab	35,410	29,355	83	3,748	2,179	58	610	1,100	180
Aleppo	24,980	27,634	110	183,140	254,073	138	273,036	229,387	84
Idleb	40,122	18,480	46	42,798	48,530	113	32,969	47,129	143
Lattakia	6,510	6,309	97	10,000	14,758	147	4,440	4,178	94
Tartous	3,670	2,919	79	21,140	28,355	134	1,050	4,035	384
Al-Rakka	-	7,443+	-	92,070	97,812	106	204,380	202,056	99
Deir-Ez-Zor	-	-	-	-	33,600	-	11,00	10,200	92
Al-Hasakeh	125,108	120,235	96	201,567	366,548	182	294,414	327,510	112
Dar'a	-	-	-	58,895	72,250	122	45,480	12,417	27
Al-Sweida	-	-	-	48,480	37,627	77	25,730	12,765	49
Quneitra	-	35	-	5,350	5,350	100	535	535	100
TOTAL	243,513	220,039	90%	807,356	1,129,245	139%	1,079,317	1,006,981	93%

+ Actual includes Euphrates valley but plan did not

APPENDIX 1 (CONT'D)

Mohafazat	Irrigated Mexican Wheat			Other Irrigated Wheat			Irrigated Barley		
	Plan	Actual	Actual Plan %	Plan	Actual	Actual Plan %	Plan	Actual	Actual Plan %
Damascus City	-	-	-	-	65	-	-	30	-
Damascus	4,270	4,120	96	6,000	11,325	188	-	3,560	-
Homs	2,541	2,266	89	5,363	2,845	53	300	669	223
Hama	6,649	5,161	77	6,760	3,004	44	1,179	1,397	118
Al-Ghab	-	-	-	-	-	-	-	-	-
Aleppo	21,830	25,417+	116	9,660	5,270	54	-	613	-
Idleb	5,221	4,386	84	-	21	-	-	370	-
Lattakia	1,690	-	-	-	-	-	-	-	-
Tartous	2,420	1,498	62	1,880	1,316	66	-	123	-
Al-Rakka	30,480	23,885++	78	-	5,450	-	-	1,752	-
Deir-Ez-Zor	44,250	39,984	90	-	2,882	-	5,753	5,400	94
Al-Hasakeh	37,900	35,972	94	-	1,037	-	-	844	-
Dar'a	-	-	-	1,960	2,130	112	-	20	-
Al-Sweida	-	-	-	-	-	-	-	-	-
Quneitra	-	100	-	300	200	67	-	-	-
TOTAL	157,251	142,789	90	32,023	35,645	113	7,214	14,511	201

\+ Farmers obtained a license for local wheat varieties but planted Mexican wheat instead

++ Actual includes Euphrates valley but the plan did not

Source: State Planning Commission

Appendix 2

Wage Rates and Conditions of Employment for Hired Farm Labor

Wage rates and conditions of employment for hired farm labor are under the jurisdiction of the Ministry of Labor and Social Affairs (MLSA). However, the Ministry's jurisdiction does not include hired labor on state farms nor workers employed by the government. Thus, the jurisdiction of the MLSA applies to cooperatives, private farms and their owners, and the workers employed.

Determination of Wage Rates

Each Mohafaza has a commission for recommending wage rates for farm workers. The commission meets each year to suggest wage rates for various types of farm labor at the Mohafaza and Mantika level. These are reviewed by representatives from the MLSA, MAAR, and the General Peasants' Union (GPU). A judge, following a hearing of the views of interested parties, then makes a decision. If rejected, the recommendation is returned to the Mohafaza for review and redrafting. Thus, wages may vary among Mohafazat and Mantika. Farm wages are based on cost of living in the local area as well as the productivity expected from the labor. Thus, tractor drivers, irrigators, general farm workers, and so forth receive different wage rates - the higher the degree of skill, the higher the wage rate.

Conditions of Employment

Hired farm workers are not supposed to be required to work more than 2700 hours per year. The work week is to consist of six nine-hour days per week. Two weeks' vacation may be expected if the worker is employed at least 12 months, and special holidays may be observed. Insurance and retirement benefits now exist for State farm workers and the costs are shared. In the private sector, insurance costs are shared for work-related accidents and illnesses. Women are to receive the same wage as men for the same type of labor. Women receive maternity benefits in the form of leave from work at half pay for 20 days before and 30 days after childbirth. Workers who have worked six months may expect one month off for lengthy illnesses.

Housing standards are specified by the MLSA. For example, farm laborers must be housed separate from livestock. Also, a health unit (doctor or nurse) must be provided on each farm employing more than 100 farm workers. Generally, wages, living conditions, and other benefits are said to be better in business and industry. Many farm laborers are reportedly be moving into other sectors and agricultural labor is said to be scarce.

Appendix 3

Farm Lease Arrangements

The Ministry of Labor and Social Affairs (MLSA) sets forth guidlines for farm lease arrangements between landlords and tenants on private and cooperative farms. There are two general types of leases - the cash lease involves payment in cash for use of the land for farming, the crop share arrangement involves payment to the landlord in product for use of the land.

Crop-Share Lease, irrigated

If the land is irrigated by pumping from underground sources, the tenant pays 20 percent of the production plus the expenses of pumping. When the owner pays the irrigation tax, using canals and ditches (in the case of gravity-flow irrigation), the tenant pays 25 percent of his production. If it is a government irrigation project the charge to the tenant is 25 percent.

Crop-Share Leases, nonirrigated land

Basically, the owner receives 20 percent of the production as a return for use of the land. At the Mohafaza level the proportion of the crop received by the provider (either landlord or tenant) of each input component (i.e. machinery, fertilizer, etc.) for each commodity is individually determined. The recommendations of share of crop for each production component for each commodity is completed by Mohafaza committee and reviewed by a committee composed of representatives of the MAAR, MLSA, the GPU and an Owner's Representative (OR). This State Committee can change the recommendations of the Mohafaza committee. Technically, landlords and tenants must follow established lease guidelines. On a practical basis, it is generally understood that crop-share arrangements are a matter of negotiation between the landlord and tenant.

Cash Leases

Cash rents are negotiated between the landlord and tenant, but if the tenant complains, a judge can change the terms so that the returns to the landlord would be the equivalent of the crop-share lease.

Other Leases

The MLSA does not involve itself with livestock-share arrangements except as it would apply to wages paid for labor in general. But if an owner provides pasture for sheep, he would be entitled to 20 percent of the production. Leases are on an annual, automatically renewable basis.

APPENDIX 3 (CONT'D)

An owner can evict a tenant with a judge's decision if the tenant:

1. does not pay
2. steals
3. doesn't work the land
4. allows production to fall to less than 41 percent of normal
5. cuts productive trees unnecessarily
6. spoils the land

The owner can also take all or part of his land back from a tenant under if:

1. the owner wants to work the land himself
2. he wants to plant trees
3. he wants to change to irrigation or desires other general changes in condition
4. the tenant is unable to work or the farmer takes land through the Agrarian Reform Act

Examples of the percentage of crop share recommended for various farming operations follow below. For each commodity, two different Mohafazat for different years are given. The figures presented are not completely consistent with the guidlines it would have been better to have the same years for each commodity. An addition, the sugar beet figures are suspect because in some cases the materials are included with the operation and seem low.

Percent of crop share allowed for various farming operations
Cotton - Irrigated (Pumping)

Operation	Al-Hasakeh 1965 (% of total)	Damascus 1975 (% of total)
Plowing	4.9	3.9
Disking	0.9	0.7
Furrowing and lining	2.7	2.9
Seeding	1.8	3.1
Reseeding	0.2	0.4
Irrigation	5.9	5.5
Thinning	0.4	1.3
Hoeing and weeding	8.2	7.9
Fertilizing	0.4	0.9
Picking	13.6	9.7
Collecting residue	0.4	1.6
Bagging and transport	1.3	1.3
Application of pesticides	0.4	0.9
	41.1	40.1

APPENDIX 3 (CONT'D)

	Al-Hasakeh 1965 (% of total)		Damascus 1975 (% of total)	
Materials				
Seed	3.6		1.4	
Fertilizer	14.9		15.4	
Pesticides	3.7		2.0	
Bags and strings	5.3		4.4	
Interest for capital	2.7		0.0	
Miscellaneous	3.7		1.3	
		75.0		64.6
Pumping	10.0		15.4	
Land	15.0		20.0	
TOTAL		100.0		100.0

Percent of crop share allowed for various farming operations
Sugar Beets - Irrigated (Gravity)

	Idleb 1976 (% of total)		Homs 1978 (% of total)	
Operations				
Plowing by tractor	2.5		1.7	
Disking	2.5		1.7	
Hand plowing	1.4		5.2	
Furrowing	4.9		2.5	
Planting	2.8		5.2	
Fertilizing and fertilizer	1.4		2.5	
Irrigation and water	8.4		9.7	
Replanting	0.7		1.4	
Thinning	4.9		3.5	
Hoeing and weeding	12.7		10.4	
Applying pesticides and pesticider	1.4		1.4	
Picking	8.4		8.7	
Collecting and cleaning	10.5		8.7	
Bagging	5.6		4.2	
Guarding	0.7		0.7	
Materials				
Seed	6.2		6.1	
Land	25.0		25.0	
TOTAL		100.0		100.0

APPENDIX 4

A Brief Description of the Production Operations for Some of the Major Crops

Wheat and Barley - Irrigated

Seedbed Preparation

Labor, locally designed machines and tractors (medium to large capacity) are used. Prior to seeding the soil is either plowed, disked, or fined, usually in 3-5 operations.

Seeding

There are three main methods: broadcasting by hand labor, sowing seeds by hand labor with seeds covered by locally designed machines, grain drills for medium to large hectarages.

Cultivation

Weeding. Weeding operations are generally done by hand labor on small plots; mechanical sprayers are used on medium to large hectarages.

Irrigation. Either hand labor or machinery may be used to divide and prepare the land for irrigation. Both pump and gravity irrigation systems are used. The crop may be irrigated 5-20 times, depending upon rainfall and other weather conditions.

Fertilizing. Largely done by hand labor in small areas. Some tractors with spreaders are usedin larger fields. Trucks are used for transporting both organic and nitrogen, phosphorus and potash (N.P.K.) fertilizers.

Havesting

Two general methods: the grain may be cut by hand labor or a simple machine with the grain separated from the straw by a stationary thresher either in the field or village; self-propelled combines are used where fields are medium to large and not too stony. The rates for hired harvesting vary by region.

Wheat and Barley (Nonirrigated)

Seedbed Preparation

Where nonirrigated wheat and barley are cultivated in small areas, labor and animal power is used. Generally, the residue from the previous crop is removed, grazed, or plowed under. Prior to seeding, the land is either plowed, disked or fined, usually in 2-3 operations.

APPENDIX 4 (CONT'D)

Where hectarages are large (particularly in the southeast, north central, and northeast), mechanization for seedbed preparation prevails. This includes disk harrow after previous crop and disk harrow in the spring. Before seeding there are approximately two additional seedbed preparation operations.

Seeding

Where the hectarages are small, the seed is broadcast and covered by hand-labor methods. A second system is to add seeds behind a locally designed machine; the seeds being sown and covered by hand labor. The third system is by machine, particularly where wheat fields are large. The machine is basically a grain drill which also covers the seed. The seed depth and row spacing is regulated and uniform.

Cultivation

The primary weed control operations include hoeing and spraying. Where areas are small this is done by labor. In medium to larger areas special machines are used. In large areas weed control is by mechanical spraying. Fertilizer application is usually by hand labor for small to medium hectarages. Machines are used to spread fertilizer where areas are large.

Havesting

Where hectarages are small to medium, there are two primary methods. First, the grain may be cut by a simple machine and transported to the village for separation by a stationary thresher. In other cases the grain is cut and threshed by a stationary harvester in the field. Where fields are large, self-propelled combines are generally used. In fields near the villages the residue may be transported to the village for livestock feed.

Tomato - Irrigated

Seedbed Preparation

Deep plowing (usually two times) by machine the late spring and early summer. Thinning, dividing and canal preparation is done either by machine or by hand labor with the aid of simple instruments.

Seeding

Seeds are started in plant beds; timeliness will differ by regions. Operations are by hand labor. The plants or seedlings are then transplanted to the fields by hand labor.

APPENDIX 4 (CONT'D)

Cultivation

Irrigation is by pump or gravity and simple tools are used to prepare for and carryout irrigation operations. Fertilizing, hoeing, and replanting are all by hand labor. For pesticide application, hand-operated sprayers are used.

Harvesting

Most operations, including picking, sorting, boxing and loading, are done by hand labor with the aid of simple instruments in some cases.

Peanuts - Irrigated

Seedbed Preparation

Plowing is generally performed by machinery or animals. There are generally two plowing operations - early and late spring. Fertilizer is either applied during the previous year or before planting and covered by deep plowing.

Seeding

Hand labor or labor with the aid of locally designed instruments is used. Land is divided for irrigation either by machine or labor, it is sometimes irrigated before planting.

Cultivation

Irrigation. Combinations of labor, simple instruments and machine are used for canal preparations; both pump and gravity irrigation are used.

Reseeding. By hand labor

Replanting. Because uniform stands are important, replanting is done by hand labor.

Weeding. Sprayers are used.

Hoeing. By hand labor

Harvesting

October is usually the best harvest period. The work is carried out by hand labor or labor aided by simple machines. Drying and seed separation are done by hand labor. At times peanut harvesters are used.

APPENDIX 4 (CONT'D)

Sugar Beet - Irrigated

Seedbed Preparation

A deep plowing operation takes place in late fall, usually by machinery. Before sowing, the crop is thinned by disk harrow or a locally designed machine. Leveling and fertilizer application are both by machine and hand labor. The land is divided later, with irrigation canals prepared either by machine, hand labor, or a locally designed tool.

Seeding

Four systems are common: broadcasting, by hand labor; grain drills for larger plots or fields; sowing with the aid of a locally designed tool, with the farmer placing two or three seeds in each hole; hills prepared by machine or locally designed instruments may also be sowed by hand labor.

Cultivation

Replanting. Mainly by hand labor

Hoeing. Either by hand, locally designed tools or, in a few cases, machine.

Weeding. Some spot sprayers are used.

Irrigation. Frequency of irrigation varies from five to twenty times per plant cycle with weather conditions, soil characteristics, and planting date all important. Various combinations of machine, hand labor, nonpump irrigation, and pump irrigation are used.

Cutting of plant neck. By hand labor.

Fertilizing. Accomplished both by hand labor and machine both during seedbed preparation and after emergence.

Havesting

Havesting periods vary by planting date and region. Combination of hand labor, machine, and locally designed tools and instruments are used. Sugar beet harvesters can be used. Cutting of the remaining plant neck (before marketing) is by hand. Transporting, handling, and other marketing operations utilize both machinery and hand labor.

APPENDIX 4 (CONT'D)

Dry Legumes (Lentils and Chickpeas)

Seedbed Preparation

The land is plowed or cultivated, usually twice, by machine before sowing in the late fall; later the crop is thinned by machine.

Seeding

Common methods are broadcasting by hand labor; sowing by use of hand labor and a simple, locally designed machine, or by grain drill, a better system because of good depth and row spacing control.

Cultivation

Weeding is done by harrows and at times by hand labor on small hectarages; fertilizing is mainly done by hand labor.

Havesting

Lentils mature in late April and May, whereas chickpeas mature in June or July. Harvesting operations are done by hand labor, although some experiments are being conducted with legume harvesters. Transporting is done by machine. Threshing in the village is either by machine or simple devices using animals and labor.

Cotton - Irrigated

Seedbed preparation

Deep plowing is done in early winter, thinning in late winter by machinery. Both fertilizing and disk harrowing are done by machinery. About 15 days before sowing, the land is divided by labor or machinery, irrigated, and then hilled after a suitable drying period. Locally designed machines are sometimes used for the hilling operations.

Seeding

Four methods are used: Broadcasting after irrigation by hand labor, with the seeds covered by a locally designed machine; sowing with the assistance of locally designed machine; sowing with locally designed instruments after fining, irrigation and hilling is completed; or, on medium to large hectarages, either drills or planters with hilling done by machinery after the emergence stage.

APPENDIX 4 (CONT'D)

Cultivation

Reseeding. By hand labor.

Transplanting. Mainly by hand labor.

Weed Control. Some locally designed instruments are used for hoeing.

Fertilizing. Both machinery and hand labor are used.

Irrigation. Both soil and weather conditions affect water requirements and watering intervals. Both pump and nonpump irrigation is used. Both hand labor and machinery are used for irrigation canal preparation.

Harvesting

Mainly done by hand labor, though some experiments with mechanical harvesters are underway. The harvest period is from August till November depending upon the area. Thinning is done by machinery.

Tobacco - Nonirrigated

Seedbed Preparation

Plowing. This operation is carried out two or three times during the fall, winter, and early spring.

Thinning. By cultivator, disk harrow, or locally designed machine

Hilling. By hand labor or a locally designed machine.

Seeding

Plants from plant beds are transplanted by hand labor.

Cultivation

Fertilizing. This operation is done either by hand labor, tractor, or a locally designed machine.

Replanting. By hand labor.

Weed Control. Hoeing by hand labor or cultivator. Some spot sprayers are used.

Hilling. Both locally designed machines and hand labor are used.

Topping. By hand labor.

APPENDIX 4 (CONT'D)

Harvesting

Harvesting is done by hand labor. The various steps such as grading, transporting, and sorting (both before and after drying) as well as drying, storage, and other harvesting and marketing activities are primarily by hand labor.

Olive Trees (Irrigated and Nonirrigated)

Organic fertilizer application is mainly by hand labor, with trucks used to haul both organic N-P-K fertilizers. When these trees are irrigated, the frequency of irrigation varies by stabilization zone. Hand labor, pump irrigation and gravity irrigation, some machinery, and locally designed tools are used for irrigation procedures. Pruning and grafting are both by hand labor. Pesticide application is by both hand-operated and mechanized sprayers of difference capacities, depending upon the size of the orchard. Harvesting and boxing are by hand labor, with transport to market by machinery. Hand labor and developed machinery are used for processing.

Production Operation	Mechanical (M) or Labor (L)	Remarks
Fertilizing	L	Organic fertilizers are applied each three or four years. N-P-K fertilizer application annually.
Irrigation	M, L	Number of irrigations differ by stabilization areas. One or two times is sufficient in drier months in first stabilization zone. In the fourth and fifth stabilization zone farmers may irrigate six or eight times during vegetative stage
Pruning	L	-
Grafting	L	-
Pesticide application	M 1/	-
Harvesting	L 2/	-
1. Boxing	L	-
2. Transporting	M	-
3. Loading and marketing	L	-
4. Olive processing	M	-

1/ The sprayer capacity and whether the sprayer is hand-held or mechanical depend upon the size of orchard.

2/ Mechanical methods for olive fruit harvesting is in an experimental stage.

APPENDIX (CONT'D)

Grape (Irrigated and Nonirrigated)

Both organic and N-P-K fertilizers are applied during the vegetative period by hand labor and simple tools. Where irrigated, a furrow system is used (see schedule). Pruning and grafting are done by hand. Combinations of tractors, horses with cultivators, and hand labor are used for orchard cultivation and weed control. Hand-held sprayers are mainly used for pesticide application. Harvesting, boxing, sorting, and packing are by hand labor and simple instruments. Transporting, loading, and marketing is done by machinery and hand labor.

Production Operation	Mechanical (M) Labor (L)	Remarks
Fertilizing	L, M 1/	During vegetative period two or three times
Irrigation	L, M 1/	3/ 4/
Pruning	L	-
Grafting	L	-
Hoeing	M 5/ L+M 6/, L	-
Pesticide application	M, L	-
Harvesting		
1. Boxing	L 7/	-
2. Sorting	L 7/	-
3. Packing	L 7/	-
4. Transporting	M	
5. Loading	L	-
6. Marketing	L	-
7. Processing	M	-

1/ Locally designed machine or simple instrument
2/ Both pump and gravity irrigation is applied
3/ Furrow system related to topography
4/ Considering both irrigated and nonirrigated orchards
5/ Capacity of tractors differs according to size of orchard
6/ Locally designed machine
7/ With other instruments

APPENDIX 4 (CONT'D)

Apricots (Irrigated)

Apricot cultivation consists of the following field operations: Fertilizer is applied by hand labor for both organic and chemical fertilizers. Both pump and gravity irrigation is used with hand labor for irrigation operations (other than pumping itself). Technical, agronomic, and climatic aspects are important. Grafting, pruning and spraying and mainly done by hand labor with the aid of simple instruments and sprayers of various capacities. Orchard cultivation is either by tractors or animals, with cultivators for weed control and preparation for intercrops. Harvesting is by hand labor with the aid of simple instruments for sorting and boxing. Transporting, loading, marketing and canning are a combination of done by machinery, including trucks, and hand labor.

Production Operation	Mechanical (M) or Labor (L)	Remarks
Fertilizing	L, M 1/	-
Irrigation	L, M 2/	3/
Grafting	L	-
Pruning	L	-
Pesticide Application	M 4/, L	-
Cultivation or Weed Control	L, M	-
Harvesting		
1. Picking	L	-
2. Sorting	L	-
3. Boxing	L 5/	-
4. Loading	L	-
5. Marketing	L, M	-
6. Canning	M	-

1/ Trucks used for transporting fertilizer
2/ Both pump and gravity irrigation applied
3/ Irrigation applied 4-8 times during summer or according to climatic conditions
4/ Different capacity sprayers used according to hectarages under cultivation
5/ Other simple instruments are used

APPENDIX 4 (CONT'D)

Citrus (Irrigated)

Both green manure (some legumes) and N-P-K fertilizers are applied by hand labor. Pump irrigation and gravity irrigation are controlled by hand labor assisted by simple instruments other than the irrigation pumps themselves. Climate conditions, tree stage and water requirements per hectare are closely associated. Pesticide application is by sprayers, some hand and some machine operated. Cultivation for weed control is necessary and either tractors or horses with cultivators are used. Some weed control is by hand labor. Chemical herbicides are used also, usually at relatively frequent intervals, and are applied by sprayers and labor. Pruning and grafting are by hand labor. Citrus harvesting, sorting, boxing, and packing is done by hand labor and simple instruments. Many types and sizes of equipment are used for transportation.

Production Operation	Mechanical (M) or Labor (L)	Remarks
Fertilizing	L	For green manure and N-P-K fertilizers
Irrigation	L, M 1/	2/
Grafting	L	-
Pruning	L 3/	-
Spraying		
1. Pesticide	M, L	-
2. Herbicide	M, L	-
Cultivation	M, LM 4/, L	-
Harvesting		
1. Picking	L	-
2. Sorting	L	Handling
3. Boxing	L	-
4. Packing	L 3/	-
5. Transporting	M 5/	-

1/ Both pump and gravity irrigation
2/ Furrow system is common
3/ Miscellaneous tools are used
4/ Some simple cultivators, usually pulled by horses
5/ Different sizes and types of machines

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CHAPTER IV

FARM SURVEY

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FARM SURVEY

A. Introduction

A nationwide farm survey, based on interviews with a sample of some 1,500 farm holders in 101 villages, was carried out in the summer of 1979 to provide the detailed farm-level data needed for assessing the agricultural production process in Syria. The survey results are expected to provide government planners and other officials with additional means for evaluation and further development of sector policies and programs, such as those on crop allocations, pricing, input subsidies and credit, which are being utilized to achieve agricultural sector goals. In addition, the farm survey data, together with the farming system data presented in Chapter III of this Annex, provided a basis for better understanding of predominant farming systems and operations, including factors associated with variations in crop yields.

In conducting the survey, a detailed questionnaire was used to obtain information on production practices, costs and returns for all major crops, with the 1977-1978 crop year serving as the base period for all data. The sample included from one to as many as five villages in each of the 53 Resource Planning Units (RPUs) that had been identified for Syria's natural resource base. To facilitate analysis of the survey data, the information on the various crops was aggregated both by RPUs and by Type of Farming Regions. (Details on sampling, survey and analytical procedures are given in Appendices 1 and 2 of this Chapter. Further information on RPUs is presented in Volume 2, Chapter I, and on type of Farming Regions in Volume I, Chapter II.)

The Farm Management Data Collection and Analysis System (FMDCAS), an electronic data processing, storage, and retrieval system developed by K. H. Friedrick, Food and Agriculture Organization (FAO), Rome, was used in designing the questionnaire for data collection and in the processing of data. H. Kunert and A. Van Wulften Palthe, FAO, assisted in development of the survey questionaire. Madami al Dusoky, Arab Organization for Agricultural Development, was responsible for the sample design. John Dixon and Scott M. Williams, FAO, supervised data processing in Rome for return to the Agricultural Sector Assessment project staff in Damascus. Neil Carpenter, Chief of AGSP-FAO, Rome, and William A. Faught, Co-Director of the SASA Project, Damascus, coordinated the activities associated with transferring survey data tapes from Damascus to Rome and the return of the computer output.

Byron Peterson and Keith D. Rogers, SASA project staff, served as farm survey specialists, assisting at all levels in Damascus and in Rome with modifying the questionnaire, supervising field enumeration, editing questionnaires, processing of survey data, and designing formats for data analyses.

Calvin C. Boykin, Jr., Production Economist, SASA project staff, assisted in editing and transferring data for analysis, supervised additional data tabulations, conducted costs and returns and yield response analyses, and prepared this chapter.

The farm holder survey was completed only through the efforts of a considerable number of SARG officials. Training of field enumerators and supervision of data collection was the responsibility of Said Halabi, Co-Director of the SASA project and Hamid Safadi, Head, Statistical Division, Planning and Statistics Directorate, MAAR. Hassan Habal, Director , Agricultural Statistics, CBS, and Farouk Ossman, Planning and Statistics Directorate, MAAR, assisted with the training and supervision of field enumerators, and supervised coding and transcribing survey data for punching onto computer tapes. M. Fattal, Director, Computing Center, CBS, and Omar Dakkak, also with the Center, supervised punching of tapes for shipment to FAO, Rome, for processing. They also processed some of the non-aggregated survey data at the Computing Center in Damascus.

Hassan Mekari, Inam Mustariki, Basheer Halabi, Fayeze Sawaf, Linda Sabba, and Noura Balke, MAAR, assisted with additional analysis of computerized farm survey data.

Raghad Sheikh-Al-Ard, State Planning Commission, assisted with data interpretations.

B. Costs and Returns--Controlled Crops

In analyzing the results of the farm survey, particular attention was paid to crops controlled by the government. These crops include wheat, barley, lentils, chickpeas, cotton, sugar beets, tobacco and peanuts. For the most part, these crops require licenses from the government for production. The government announces prices, fixes bonuses, and purchases all or part of the total production. Results of the farm survey may have special implications to the government in planning for production of these crops. However, the survey results contain input-output, costs and returns information for one crop year only, which would be subject to change in subsequent crop years as fluctuations in weather and prices occur, and as improved farming practices are adopted.

Local Wheat

According to the farm survey results, the total cost of producing local wheat in Syria during the 1977-1978 crop year was 47 SL per dunom and 61 SL per 100 kg (Table 1). Over one-third of the local wheat producers interviewed irrigated their wheat. Unpaid family labor, for which a value was imputed, made up about one-fourth of the total costs, while variable costs, consisting primarily of cash costs, amounted to 34 SL per dunom and 44 SL per 100 kg. The average value of product reported by farm holders was 74 SL per 100 kg, a figure consistent with the government announced prices at 72-77 SL per 100 kg.

Seed and tractor power together accounted for over 60 percent of the variable cost items used in local wheat production, while fertilizer and hired labor accounted for about 20 percent of the variable cost.

Gross margin for local wheat production in Syria was 21 SL per dunom, while net earnings, the remainder after subtracting imputed family labor costs, amounted to 9 SL per dunom. On a per 100 kg basis gross margins averaged 29 SL and net earnings 13 SL.

Table IV-1. Estimated Production Costs and Returns in For Local Wheat By Region, Cropyear 1977-1978, S.A.R.

Item	Coast	Moun-tain	Low-lands	Undul. Plains	Euph. and Trib.	North-east	South-west	Steppe	S.A.R.
Irr. (Pct.) 1/	84	6	68	30	88	20	26	24	35
Per Dunom: 2/									
Prod. (Kg)	143	82	116	56	143	89	70	55	77
Value of Prod. (SL)	109	58	82	39	114	64	51	40	56
Var. Costs (SL)									
Seed	12	10	9	9	16	10	8	9	10
Org. Fert.	0	1	1	0	0	0	0	1	0
Min. Fert.	5	8	12	2	5	2	1	2	3
Pest.	0	1	0	0	0	0	0	0	0
Pack.	0	2	3	0	6	4	2	1	2
H. Labor	3	6	5	3	7	1	8	4	4
Animal Power	3	5	10	1	1	1	2	1	2
Tractor Power	17	9	8	8	22	11	11	7	11
Other	2	1	1	3	19	1	0	0	2
Total	42	43	49	26	76	30	32	25	34
Rent Paid	55	0	0	0	2	0	1	1	1
Tot. Var. + Rent	97	43	49	26	78	30	33	26	35
Family Labor 3/	35	28	15	6	25	2	19	12	12
Total	132	71	64	32	103	32	52	38	47
Gross Margin 4/	12	15	33	13	36	34	18	14	21
Net Earnings 5/	-23	-13	18	7	11	32	-1	2	9
Per 100 kg (SL): 6/									
Value of Prod.	76	71	70	71	80	74	73	74	74
Var. Cost	38	52	51	47	54	33	47	41	44
Var. Cost + Rent	68	52	51	47	55	33	48	42	45
Family Labor 3/	17	34	13	11	18	2	27	21	16
Total Cost	85	86	64	58	73	35	75	63	61
Gross Margin 4/	8	19	19	24	25	41	25	32	29
Net Earnings 5/	-9	-15	6	13	7	39	-2	11	13

1/ Proportion of holders reporting
2/ Weighted by total number of dunoms
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost and rent
5/ Value of production less total cost
6/ Weighted by total production

The lowest variable and total costs per 100 kg of producing local wheat was in the Northeast Region at 33 SL and 35 SL, respectively. Per dunom variable cost was 30 SL, while total cost was 32 SL. This region accounted for 24 percent of the production and 21 percent of the hectarage reported in the survey. The relatively high yield of 89 kg per dunom, with only one-fifth of the producers reporting irrigation, was one of the factors leading to lower per 100 kg costs. At the same time, the farms of the region are larger and more highly mechanized, as indicated by lower costs for hired and family labor, and relatively high costs for tractor power. Both gross margin and net earnings were higher in this region than any of the others.

According to survey results, farm holders in all RPUs in the Northeast Region produced local wheat during the crop year 1977-1978 (Appendix Tables 11 and 12). The largest proportion of dunoms and production within the region occurred in RPUs38, 46, 51 and 52. Rainfed farming characterized local wheat production in most RPUs with the exception of RPUs41 and 51, where considerable proportions of holders reported irrigation. The lowest total cost per dunom for producing local wheat in the Northeast, 21 SL, occurred in RPU45, where yields, gross margin and net earnings also were lowest. Gross margin and net earnings per dunom were highest in RPU54, at 77 SL, where yield was 131 kg/dunom. The highest total cost per dunom, 53 SL, was experienced in RPU56 where yields also were highest, while gross margin and net earnings, amounting to 19 SL/dunom, were lowest in RPU46. The lowest total costs per 100 kg was 19 SL, which occurred in RPU54, while the highest gross margin and net earnings amounted to 59 SL/100 kg, also in RPU54. The highest total cost, 49 SL/100 kg, was found in RPU50, while the lowest gross margin, 26 SL/100 kg, occurred in RPU38, and the lowest net earnings, 18 SL/100 kg, in RPU41. For the Northeast as a whole, variable costs per dunom decreased with farm size, while the value of family labor was the same regardless of farm size. Gross margin and net earnings per dunom were the same for small and large farms and lower for medium-sized farms. No definite differences existed among farm size groups in variable and total costs per 100 kg, although gross margins and net earnings were somewhat higher for the smaller farms than for the other farm sizes.

The Undulating Plains Region, another important wheat producing region, which accounted for 17 percent of the production and 24 percent of the hectarage reported in the survey, experienced the next lowest total costs per 100 kg despite a yield of only 56 kg per dunom. Relatively lower hired and family labor costs, resulting from a high level of mechanized production probably explain this cost of production and higher net earnings situation.

All RPUs in the Undulating Plains Region had farm holders who reported production of local wheat (Appendix Tables 7 and 8). Almost two-thirds of the region's total denoms in local wheat were in RPUs38 and 57. Except for RPUs20 and 23, few holders reported irrigated production. The lowest total cost per dunom for producing local wheat was 12 SL in RPU57, where yield was only 26 kg/dunom. The highest gross margin per dunom was 41 SL in RPU23, where yield under irrigation was 232 kg/dunom. The highest net earnings per dunom, 20 SL, occurred in RPUs38 and 49, where predominantly rainfed yields were 70 and 52 kg/dunom, respectively. The highest total cost per dunom, under irrigation, was in RPU23, where yield was 232 kg/dunom. The lowest

gross margin and net earnings occurred under rainfed conditions in RPUs24 and 27 at -4 SL and -33 SL/dunom, respectively. The lowest per 100 kg total cost, 32 SL, the highest gross margin and net earnings, 37 SL/100 kg, appeared in RPU49, where yield was 52 kg/dunom under essentially rainfed conditions. The highest cost per 100 kg for producing local wheat, in the Undulating Plains, 108 SL, was found in RPU27, while the lowest gross margin, -21 SL/100 kg, occurred in RPU24, and the lowest net earnings, -38 SL, appeared in RPU27. Both variable and total costs per dunom decreased with farm size for the region as a whole, while per dunom gross margins tended to decrease and net earnings increase. Total costs per 100 kg decreased with farm size, reflecting reduced family labor costs. Net earnings per 100 kg increased considerably from the small to medium-sized farms.

Despite a yield only slightly less than the national average, the important wheat producing Southwest Region had relatively high costs of production, resulting in net earnings of -2 SL per 100 kg. High hired and family labor costs, reflecting lower levels of mechanized farming, help explain this relatively unfavorable cost and income result. Almost 19 percent of the nation's total dunoms in local wheat were located in this region and slightly less of the total production.

Local wheat was produced in all RPUs of the Southwest Region (Appendix Tables 13 and 14). Approximately two-thirds of the region's land in local wheat was located in RPUs2, 4, 8 and 15, while two-thirds of the production recorded in the survey came from RPUs3, 4, 9 and 15. Lowest total cost per dunom, 16 SL, was recorded for rainfed production in RPU8, which also had the lowest yield, 14 kg/dunom. In addition, the per 100 kg total cost was highest, 107 SL. in this RPU and net earnings per 100 kg were lower at -43 SL than for any other RPU in the region. Lowest per 100 kg total cost, 37 SL. occurred for an irrigated yield of 249 kg/dunom in RPU3, which also had the highest net earnings, 28 SL/100 kg. Total cost per dunom decreased in the region from the small farm size to the medium farm size, while per dunom gross margin decreased with farm size, and net earnings increased from the small to medium-size farm. A similar pattern occurred with total cost and returns per 100 kg.

Although irrigated local wheat yields were high in the Lowlands and the Euphrates and Tributaries Region, variable costs per 100 kg were higher in these regions than the national average. Family labor costs were also high, leaving both gross margins and net earnings below the national averages. Approximately 5 percent of the nation's total dunoms in local wheat were located in the Lowlands, while almost 7 percent of the total dunoms were found in the Euphrates and Tributaries Region, according to survey results. Slightly higher proportions of total national production came from these regions because of the high yields.

In the Lowlands, local wheat production was recorded for all RPUs except RPU47 (Appendix Tables 5 and 6). Almost three-fourths of the region's total dunoms in local wheat but only 49 percent of the total production occurred in RPU26. At the same time, the 22 percent of the regional total dunoms in this crop in RPU34 produced almost 45 percent of the region's total production. The lowest total cost per dunom for producing local wheat,

41 SL, was recorded in RPU26, which also had the lowest gross margin, 10 SL/dunom, while almost two-thirds of the operators in RPU26 reported irrigation, yield was 77 kg/dunom, which combined with low family labor cost, resulted in the highest net earnings per 100 kg, 9 SL, than any of the other RPUs in the region. Holders in RPU34, with almost half reporting irrigation, had the highest yield, 236 kg/dunom, the highest total cost per dunom, 176 SL, and the highest gross margin and net earnings per dunom, 65 SL and 12 SL, respectively. While gross margin per 100 kg was highest in RPU34, 28 SL, high family labor cost reduced net earnings per 100 kg to 6 SL. Lowest gross margin and net earnings per 100 kg occurred in RPU35. Medium-sized farms had more favorable cost and returns than the other two farm sizes.

In the Euphrates and Tributaries Region, the lowest cost per dunom for producing local wheat, 43 SL, predominantly rainfed, occurred in RPU40 (Appendix Tables 9 and 10). The total cost per dunom for irrigated production in RPU32 was the highest, 147 SL. However, total cost per 100 kg was lowest in RPU32, 71 SL, and net earnings per 100 kg were highest at 10 SL. Although gross margin per 100 kg was highest in RPU40, high family labor cost reduced net earnings for holders in this RPU to 4 SL/100 kg. For the region as a whole, larger farms had the highest total cost per 100 kg and the highest gross margin and net earnings per 100 kg.

The Steppe Region, the portion cultivated lying to the northwest near the Undulating Plains, or near the Euphrates, with almost one-fourth of the holders reporting irrigation, had a relatively low variable cost of production per 100 kg. However, high family labor costs reduced net earnings to a level below the national average. With almost 16 percent of the nation's total dunoms in local wheat, the Steppe accounted for only about 11 percent of total production, according to survey results. Among the RPUs in the Steppe, RPUs13, 17, 19, 21, 31 and 41 accounted for over 90 percent of the total local wheat produced in the region. In RPUs19 and 31, the proportions of total production were less than the proportions of total dunoms in the region devoted to this crop.

Holders in RPU17, with over one-third reporting irrigation, had the highest total cost per dunom, 83 SL, and the lowest gross margin and net earnings, -13 SL and -32 SL, respectively (Appendix Tables 15 and 16). The highest gross margin and net earnings per dunom, 56 SL and 47 SL, occurred with holders in RPU21 who farmed rainfed local wheat. These holders also experienced the highest gross margin and net earnings per 100 kg at 70 SL and 59 SL. Lowest returns per dunom occurred in RPU17, while lowest returns per 100 kg occurred in RPUs18, 31 and 39. For the region as a whole, small farms had the highest total cost and return per dunom, but the lowest total cost and highest returns per 100 kg produced.

The Coastal and Mountain Regions produced only a small proportion of national wheat supply, according to survey results. Despite high yields, the high cost of rent paid reduced net earnings in the Coastal Region to -9 SL per 100 kg, and high family labor costs reduced net earnings in the Mountain Region to -5 SL per 100 kg.

The Coastal Region consists of only RPU28. while all RPUs in the Mountain Region produced local wheat. About three-fourths of the total dunoms in the Mountain Region occurred in RPUs30 and 36, while 80 percent of the region's total production occurred in these two RPUs.

With most of the operators in the Coastal Region reporting irrigated production of local wheat, the total cost per dunom amounted to 132 SL, gross margin 12 SL, and net earnings -23 SL (Appendix Tables 1 and 2). Total cost per 100 kg amounted to 85 SL, while gross margin was 8 SL and net earnings -9 SL. Small farms had the lowest total cost and highest returns. The lowest total cost, 37 SL per dunom, in the Mountain Region was reported by rainfed producers in RPU37, who also had the highest gross margin, 24 SL/dunom, and the highest net earnings, 3 SL/dunom (Appendix Tables 3 and 4). The holders in RPU37 also received the highest gross margin and net earnings per 100 kg, 38 SL and 27 SL, respectively. The highest total cost and lowest returns were experienced by holders in RPUs29 and 30. A major factor in the low net earnings was the high value of unpaid family labor. Total cost per dunom and per 100 kg were higher for the small and medium-sized farms, while returns were also lower for these farms.

Plotting in cumulative fashion variable and total costs of producing 100 kg of wheat for each RPU against the proportion of total production from each RPU provides a useful means of viewing the cost of production structure for Syria (Fig. 1). At the average value of production reported in the survey of 74 SL per 100 kg, over 98 percent of the total production had variable costs of 74 SL or less, while 76 percent of the total production was produced at a total cost of less than this price.

The values of local wheat by-products, mainly in the form of straw for sale or the returns from grazing livestock on crops residues, appeared sufficient to offset the imputed value for farm labor. In the Undulating Plains, a surplus existed over this value.

Mexican Wheat

Mexican wheat is not so widely planted throughout Syria but accounts for a larger proportion of the irrigated area than local wheat. Yields generally were higher than local wheat (Table 2). Average production per dunom was 110 kg. The average value per 100 kg of 71 SL was below that for local varieties. Variable costs at the national level, both on a a per dunom and per 100 kg basis, were slightly higher for Mexican wheat than local wheat at 51 SL and 47 SL, respectively. Indicated reason for this difference was the higher expenditures for fertilizer and tractor power. Despite a lower gross margin than for local wheat production nationally, net earnings from Mexican wheat of 18 SL per 100 kg, resulting from lower family labor costs, were slightly higher than for local wheat.

Approximately 59 percent of the nation's total dumons and 55 percent of the nation's total production of Mexican wheat, according to survey results, occurred in the Northeast Region. Producers under rainfed conditions in RPU54 had the lowest total cost per dunom, 24 SL, although their

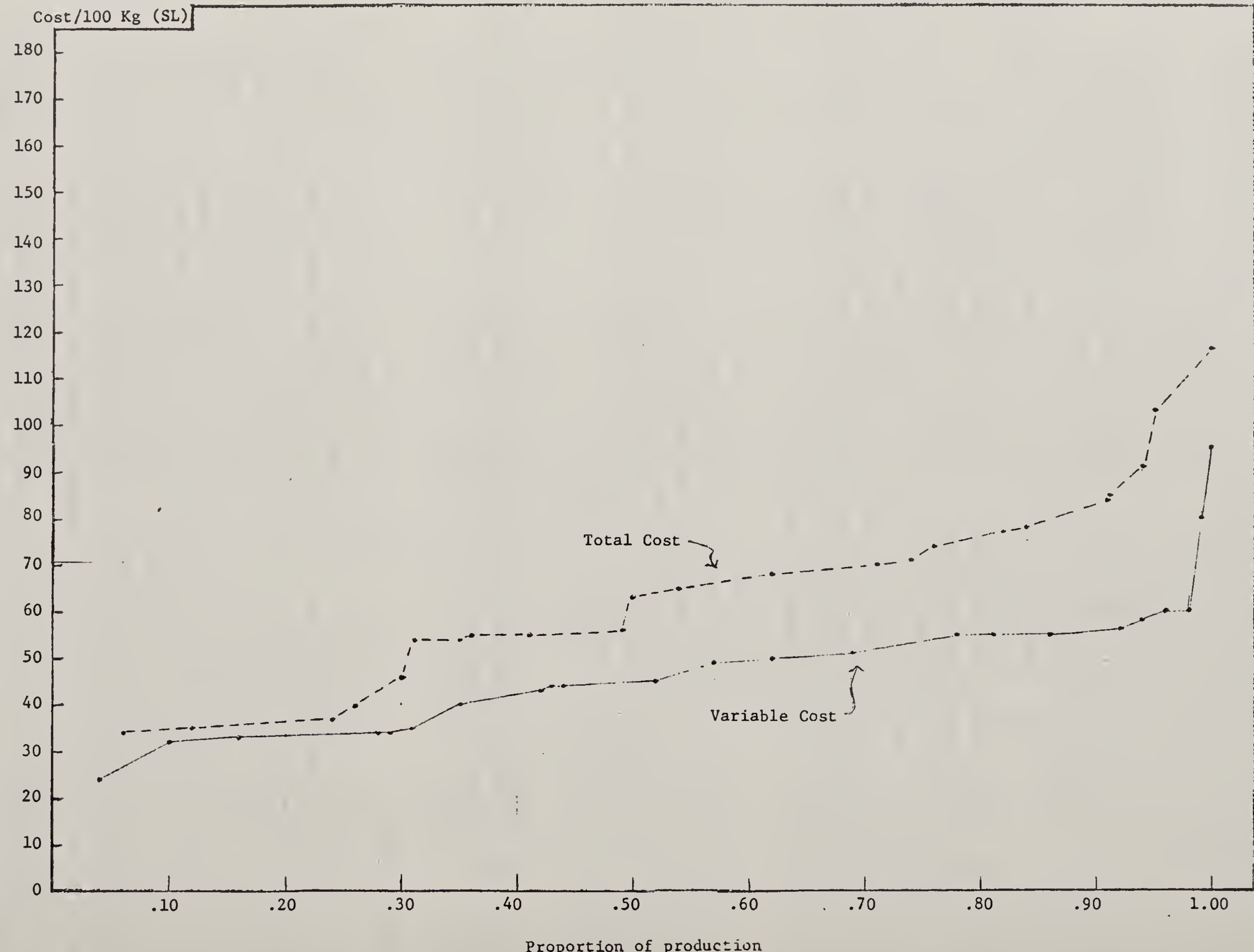

Figure IV-1. Cumulation of Local Wheat Production by Cost Levels, Cropyear 1977-1978,SAR

Table IV-2. Estimated Production Costs and Returns in For Mexican Wheat By Region, Cropyear 1977-1978, S.A.R.

Item	Coast	Moun-tain	Low-lands	Undul. Plains	Euph. and Trib.	North-east	South-west	Steppe	S.A.R.
Irr. (Pct.) 1/	-	0	84	0	100	25	-	4	41
Per Dunom: 2/									
Prod. (Kg)	-	72	119	53	229	103	-	99	110
Value of Prod. (SL)	-	52	78	37	171	73	-	67	77
Var. Costs (SL)									
Seed	-	9	9	17	13	9	-	10	9
Org. Fert.	-	0	0	0	0	0	-	0	0
Min. Fert.	-	7	15	2	12	5	-	2	8
Pest.	-	1	2	0	0	0	-	0	1
Pack.	-	1	4	3	7	11	-	2	8
H. Labor	-	5	3	3	2	1	-	0	2
Animal Power	-	0	1	0	1	0	-	0	0
Tractor Power	-	9	19	8	36	15	-	11	17
Other	-	0	1	0	21	8	-	4	6
Total	-	32	54	23	92	49	-	29	51
Rent Paid	-	0	0	0	0	0	-	5	0
Tot. Var. + Rent	-	32	54	23	92	49	-	34	51
Family Labor 3/	-	17	9	1	28	4	-	10	8
Total	-	49	63	24	120	53	-	44	59
Gross Margin 4/	-	20	24	14	79	24	-	33	26
Net Earnings 5/	-	3	15	13	51	20	-	23	18
Per 100 kg (SL): 6/									
Value of Prod.	-	72	66	70	75	71	-	68	71
Var. Cost	-	44	49	44	38	47	-	29	47
Var. Cost + Rent	-	44	49	44	38	47	-	34	47
Family Labor 3/	-	25	7	1	12	4	-	10	6
Total Cost	-	69	56	45	50	51	-	44	53
Gross Margin 4/	-	28	17	26	37	24	-	34	24
Net Earnings 5/	-	3	10	25	25	20	-	24	18

1/ Proportion of holders reporting
2/ Weighted by total number of dunoms
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost and rent
5/ Value of production less total cost
6/ Weighted by total production

gross margin and net earnings per dunom, as a result of lower yields, were the lowest at 14 SL (Appendix Tables 25 and 26). Highest gross margin and net earnings per dunom occurred among holders in RPU56, at 64 SL. The producers raising Mexican wheat under rainfed conditions also had the lowest total cost per 100 kg, 24 SL, and the highest gross margin and net earnings, at 36 SL/100 kg. Producers in RPU52, with over half reporting irrigation, received the lowest gross margin and net earnings at 14 SL and 10 SL, respectively.

Mexican wheat production in the Lowlands, largely irrigated, accounted for about one-fourth of the nation's total dunoms in this crop and slightly more of the proportion of total production. Production was recorded during the farm survey in all RPUs of the region except RPU47 (Appendix Tables 19 and 20). Lowest total cost of production per dunom, 61 SL, occurred in RPU26, which also had the highest gross margin and net earnings per dunom, 27 SL and 17 SL, respectively. With slightly less than one-third of the holders in this RPU reporting irrigation, total costs per 100 kg, 53 SL, were also lowest, while gross margin of 24 SL/100 kg and net earnings of 15 SL/100 kg were also highest. Highest total cost per dunom and per 100 kg , and lowest returns per dunom and per 100 kg were experienced by holders in RPU35, where all production occurred under rainfed conditions. Total cost was lower and returns were higher for medium-sized farms in the region than for either the small or large-size farms. Large farms received negative returns.

Although the Euphrates and Tributaries Region had only 5 percent of the nation's total dunoms in Mexican wheat, according to survey results, the region accounted for 11 percent of total production. Within the region, this crop was produced in RPUs32 and 40 only under irrigation (Appendix Tables 23 and 24). Producers in RPU40 experienced the highest gross margin and net earnings per dunom at 152 SL and 107 SL, respectively. Although their total cost per dunom was higher, yield was sufficiently higher to result in the lowest total cost per 100 kg and also the highest gross margin and net earnings at 45 SL and 32 SL/100 kg. While the small farms in the region had the highest per dunom total cost and the highest per dunom net earnings, the large farms experienced the highest total cost per 100 kg, but also received the highest net earnings.

The remaining regions where Mexican wheat occurred include the Mountain, Undulating Plains, and Steppe, however, their combined total number of dunoms and production amounted to only 11 percent and 6 percent, respectively. Total cost per dunom was generally highest in the Mountain Region (Appendix Tables 17 and 18), while gross margin and net earnings per dunom were highest in the Steppe (Appendix Tables 27 and 28). For the most part, production in these regions occurred under rainfed conditions except for RPU31 in the Steppe. Total cost was lower per 100 kg in the Steppe, while returns were also higher than in these remaining regions. The Undulating Plains (Appendix Tables 21 and 22) ranked next among these latter regions in lowest cost and highest returns.

Graphing variable and total costs per 100 kg for each RPU in relation to proportion of total production reveals that over 97 percent of the total

production was produced at a total cost of less than the 71 SL average price received per 100 kg (Fig. 2). Variable costs would be covered on all production at this price.

The value of Mexican wheat by-products covered family labor imputed costs in all producing regions with the exception of the Steppe, where by-products values were 2 to 5 SL less than family labor costs.

Barley

Barley was produced in all regions (Table 3). Production was predominantly under rainfed conditions except in the Euphrates and Tributaries Region where half the farm holders reported irrigated production. Average yield nationally was 49 kg per dunom and the average price received was 54 SL per 100 kg. Variable costs amounted to 19 SL per dunom and 40 SL per 100 kg. Gross margins were 85 SL and 14 SL, respectively, while net earnings were 2 SL and 1 SL.

Over 90 percent of the nation's total dunoms in barley in 1977-1978, according to survey results, occurred in the Undulating Plains, Euphrates and Tributaries, Northeast, Southwest, and Steppe Regions.

The Undulating Plains accounted for about 39 percent of the nation's total dunoms in barley and 38 percent of the total production. All RPUs in the region had production of this crop (Appendix Tables 35 and 36). The lowest total cost per dunom, 9 SL, occurred in RPU24, although the yield of only 11 kg/dunom resulted in the lowested returns per dunom and per 100 kg produced of all RPUs in the region. Highest net earnings per dunom, 17 SL, and highest gross margin per 100 kg, 30 SL, were experienced by producers in RPU20. Farm holders in RPU49 had the highest net earnings of all producers in the region at 21 SL/100 kg. The large farms in the region tended to have the lowest total cost per dunom and per 100 kg and the highest returns.

The Steppe Region accounted for some 18 percent of the nation's total dunoms in barley and 36 percent of the total production. All RPUs except RPU33 had barley production. The lowest total cost of production per dunom, 12 SL, and the lowest per 100 kg, 49 SL, were experienced by holders in RPU31, who also received the highest net earnings at 1 SL/100 kg. Crop failures occurred in RPU18, resulting in losses of 24 SL/dunom. The highest gross margin per 100 kg, 21 SL, was recorded in RPU41, while the lowest gross margin and net earnings among producers who harvested a crop were in RPU39. Net earnings were negative in all RPUs except RPU31, despite a relatively high amount of irrigation in RPUs 13 and 17. The large farms in the Steppe generally had the lowest total cost per 100 kg and the highest returns.

Barley was produced in all RPUs in the Northeast Region except RPU55, according to farm survey tabulations. About 16 percent of the nation's total dunoms of barley and 12 percent of the total production occurred in the Northeast. The lowest per dunom total cost, 15 SL, resulted in RPU54, where the farm holders earned the highest gross margin and net earnings of 50 SL/100 kg (Appendix Tables 39 and 40). The lowest gross margins were

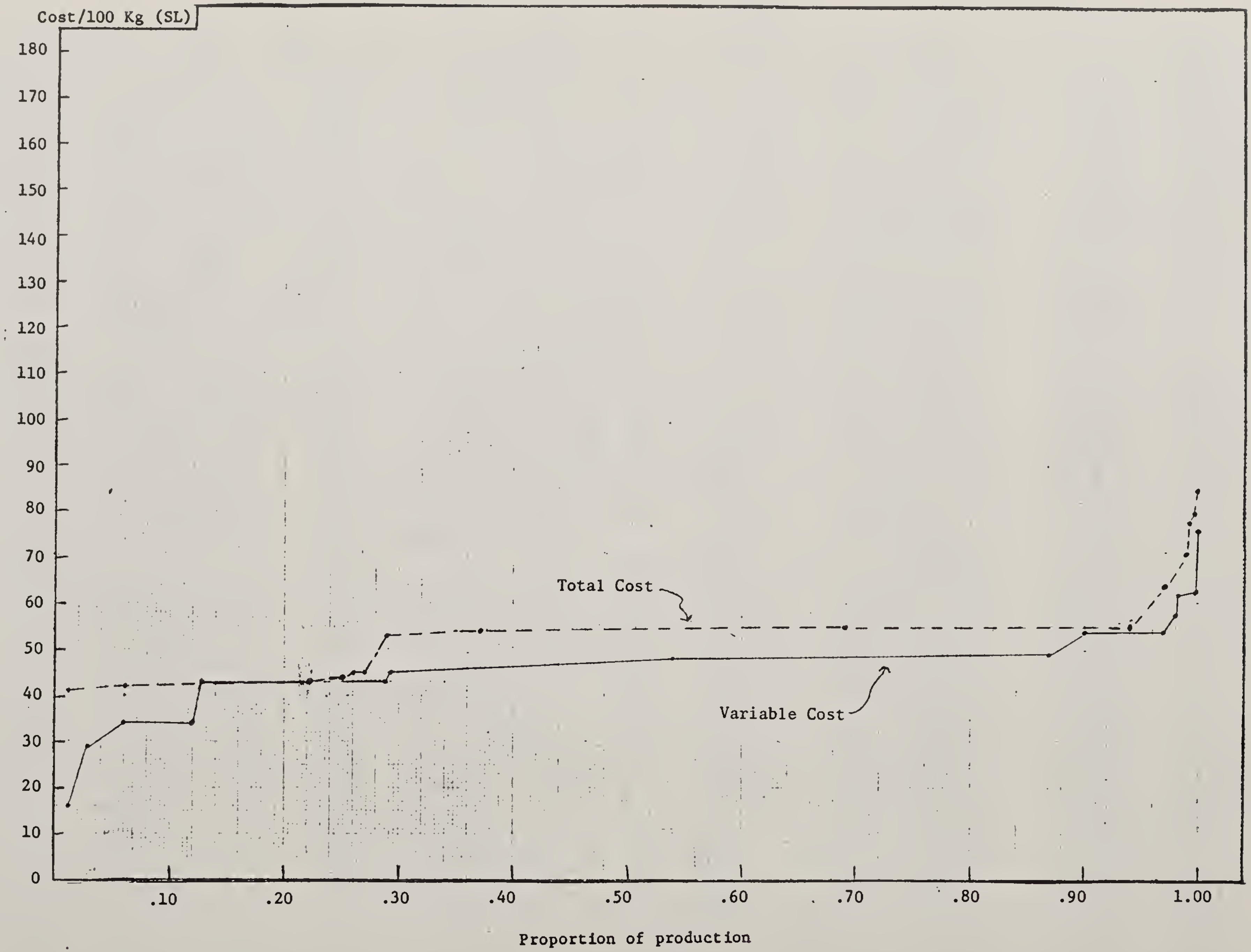

Figure IV-2. Cumulation of Mexican Wheat Production by Cost Levels, Cropyear 1977-1978, SAR

Table IV-3. Estimated Production Costs and Returns in For Barley By Region, Cropyear 1977-1978, S.A.R.

Item	Coast	Moun-tain	Low-lands	Undul. Plains	Euph. and Trib.	North-east	South-west	Steppe	S.A.R.
Irr. (Pct.) 1/	0	12	4	4	50	2	15	11	9
Per Dunom: 2/									
Prod. (Kg)	223	74	93	56	75	75	50	26	49
Value of Prod. (SL)	122	61	54	31	40	38	33	14	27
Var. Costs (SL)									
Seed	10	10	6	6	7	6	6	5	6
Org. Fert.	0	0	2	0	0	0	0	0	0
Min. Fert.	16	4	13	1	1	1	0	0	1
Pest.	0	0	0	0	0	0	0	0	0
Pack.	0	2	4	2	4	4	1	1	2
H. Labor	25	12	4	1	1	1	6	2	2
Animal Power	10	3	0	1	1	0	3	0	1
Tractor Power	41	5	10	6	12	11	5	5	6
Other	0	0	0	0	5	2	1	0	1
Total	102	36	39	17	31	25	22	13	19
Rent Paid	0	0	0	0	1	0	0	1	0
Tot. Var. + Rent	102	36	39	17	32	25	22	14	19
Family Labor 3/	83	27	14	5	5	2	16	5	6
Total	185	63	53	22	37	27	38	19	25
Gross Margin 4/	20	25	15	14	8	13	11	0	8
Net Earnings 5/	-63	-2	1	9	3	11	-5	-5	2
Per 100 kg (SL): 6/									
Value of Prod.	55	61	58	55	54	50	57	51	54
Var. Cost	46	36	42	32	42	33	44	48	40
Var. Cost + Rent	46	36	42	32	43	33	44	50	40
Family Labor 3/	37	27	15	9	7	3	29	17	13
Total Cost	83	63	57	41	50	36	73	67	53
Gross Margin 4/	9	25	16	23	11	17	13	1	14
Net Earnings 5/	-28	-2	1	14	4	14	-16	-16	1

1/ Proportion of holders reporting
2/ Weighted by total number of dunoms
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost and rent
5/ Value of production less total cost
6/ Weighted by total production

received in RPU51, both in terms of per dunom and per 100 kg returns. Lowest net earnings were received by producers in RPU41. Although total costs were higher per dunom and per 100 kg for small farms in the region, returns were higher for these farms than those of larger sizes.

Approximately 11 percent of the nation's total dumons of barley and 6 percent of the total production occurred in the Southwest Region. All RPUs in the region, except RPUs 3 and 16, were represented by production of this crop (Appendix Tables 41 and 42).

The lowest cost per 100 kg produced was reported by holders in RPU15, 39 SL, who also received the highest gross margin, 37 SL/100 kg, and the highest net earnings, 21 SL/100 kg. The highest cost per dunom occurred with producers in RPU10 at 64 SL, who also received the highest returns per dunom of 49 SL in gross margin and 28 SL in net earnings. Low yields in RPU2 resulted in the lowest gross margin, -7 SL/dunom and -30 SL per 100 kg. Producers in RPU8, also with a low yield, received net earnings per dunom and per 100 kg lower than those in other RPUs. No particular advantage rested with farm size in terms of lower costs or higher returns.

Barley production occurred in the Euphrates and Tributaries Region to a minor extent, although producers in all RPUs were involved in production (Appendix Tables 37 and 38). About 10 percent of the nation's total dunoms in barley and 4 percent of the total production occurred in the region. The majority of producers raised barley under irrigation, although net earnings per 100 kg ranged from 0 SL in RPU42 down to -26 SL in RPU40.

Details of costs and returns in the minor producing regions are included in Appendix Tables 29 and 30 for the Coastal Region, Appendix Tables 31 and 32 for the Mountain Region, and Appendix Tables 33 and 34 for the Lowlands Region.

While variable cost for 90 percent of the total barley production in the nation would be covered at the average price received for barley of 54 SL per 100 kg, only 72 percent of the production would have total costs covered at this price (Fig. 3).

Barley crop residues cover imputed family labor costs in all except the Coastal Region and equalled about twice the values of family labor in the Southwest and Steppe Region.

Lentils

According to farm survey tabulations, the regions where most of the lentils were produced include the Lowlands, Northeast, Undulating Plains and Mountains. Although farm holders in the Southwest reported a significant proportion of the nation's total land planted to lentils, yields were so low that lentil production appeared relatively insignificant. On a nation-wide basis, lentil yields averaged 69 kg per dunom and the average price reported was 83 SL per 100 kg (Table 4). Variable costs and total costs per dunom averaged 44 SL and 52 SL, respectively. Variable and total costs per 100

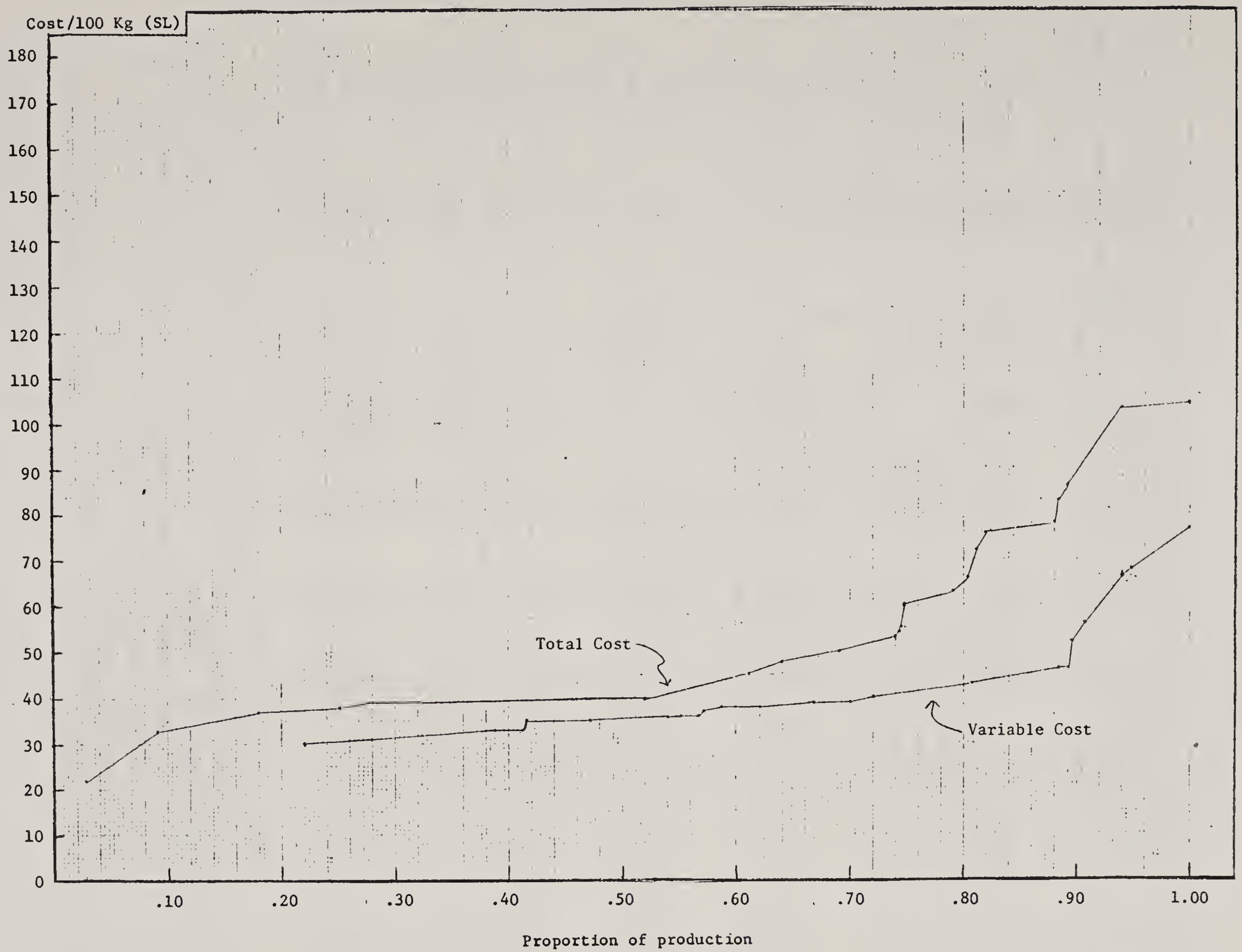

Figure IV-3. Cumulation of Barley Production by Cost Levels, Cropyear 1977-1978, SAR

Table IV-4. Estimated Production Costs and Returns in For Lentils By Region, Cropyear 1977-1978, S.A.R.

Item	Coast	Moun- tain	Low- lands	Undul. Plains	Euph. and Trib.	North- east	South- west	Steppe	S.A.R.
Irr. (Pct.) 1/	-	0	0	0	100	3	0	3	2
Per Dunom: 2/									
Prod. (Kg)	-	62	58	87	103	90	24	50	69
Value of Prod. (SL)	-	51	47	74	87	76	20	43	52
Var. Costs (SL)									
Seed	-	13	7	11	10	12	7	7	9
Org. Fert.	-	0	0	6	0	5	0	0	1
Min. Fert.	-	10	6	2	0	2	0	0	5
Pest.	-	1	2	0	0	0	0	0	1
Pack.	-	2	2	2	3	3	0	0	2
H. Labor	-	14	13	23	12	31	9	27	16
Animal Power	-	2	2	4	7	4	3	4	3
Tractor Power	-	5	4	7	11	7	2	10	5
Other	-	0	3	0	34	1	0	20	2
Total	-	47	39	55	77	65	21	68	44
Rent Paid	-	0	0	0	0	0	0	0	0
Tot. Var. + Rent	-	47	39	55	77	65	21	68	44
Family Labor 3/	-	32	3	8	39	6	6	15	8
Total	-	79	42	63	116	71	27	83	52
Gross Margin 4/	-	4	8	19	10	11	-1	-25	8
Net Earnings 5/	-	-28	5	11	-29	5	-7	-40	0
Per 100 kg (SL): 6/									
Value of Prod.	-	81	83	85	85	85	85	85	83
Var. Cost	-	75	69	63	76	73	87	135	71
Var. Cost + Rent	-	75	69	63	76	73	87	135	71
Family Labor 3/	-	51	4	9	38	6	28	30	13
Total Cost	-	126	73	72	114	79	115	164	84
Gross Margin 4/	-	6	14	22	9	12	-2	-50	12
Net Earnings 5/	-	-45	10	13	-29	6	-30	-80	-1

1/ Proportion of holders reporting
2/ Weighted by total number of dunoms
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost and rent
5/ Value of production less total cost
6/ Weighted by total production

kg averaged 71 SL and 84 SL. Nation-wide, per dunom and per 100 kg average returns just equalled or fell slightly below total cost.

Both variable costs and total cost per 100 kg were lower in the major lentil producing regions than in other regions, except for the Northeast, where variable costs were higher due primarily to high hired labor costs. Only producers in the Southwest and Steppe regions had negative gross margins per 100 kg, while producers in the major lentil producing regions received positive gross margins.

Only in the Euphrates and Tributaries Region were lentils irrigated to any large extent, although the proportion of total lentils produced in this region was relatively small. Costs of production were higher per dunom than for other regions because of the high irrigation cost reflected in imputed family labor and other costs. However, yields were not high enough to reduce per 100 kg costs below that of the major producing areas. High family labor costs reduced net earnings to a negative level.

RPU36 was the only important lentil producing RPU in the Mountain Region, encompassing over 97 percent of the region's total dunoms in this crop and also of the total production. Net earnings were negative in all RPUs of the region (Appendix Tables 45 and 46).

Only RPU26 of those in the Lowlands Region had lentil production, according to survey results. Net earnings amounted to 5 SL per dunom and 10 SL per 100 kg, with the large farms earning the highest returns (Appendix Tables 47 and 48).

RPUs25, 27, and 38 had lentil production in the Undulating Plains, while the survey found no lentil production in the other RPUs. Net earnings were highest in RPU25, 21 SL/100 kg, while negative net earnings were received in RPU27 (Appendix Tables 49 and 50). The small farms earned the highest returns.

Holders only in RPU32 produced lentils in the Euphrates and Tributaries Region. Raised under irrigation, lentils produced 9 SL/100 kg, but - 29 SL/100 kg in net earnings. The medium-sized farm had the positive gross margin.

Producers in the Northeast who raised lentils were located in RPUs38, 52 and 54 as revealed in survey tabulations (Appendix Tables 53 and 54). Highest net earnings, 37 SL/100 kg, were received by producers in RPU 52, all of whom reported irrigated production. Producers in RPU38 received net earnings of 14 SL/100 kg for rainfed production of lentils.

In the Southwest lentil production, all of which was rainfed, was reported by farm holders in RPUs2, 4 and 5 (Appendix Tables 55 and 56). Over two-thirds of the region's total dunoms in lentils were located in RPU2, although less than half of the total production came from this RPU. One-fourth of the region's total dunoms, but almost 40 percent of the total production, were located in RPU4. Gross margins amounted to 43 SL/100 kg in

RPU5, 15 SL/100 kg in RPU4, and -30 SL/100 kg in RPU2. Net earnings were negative in all three RPUs.

Lentil production in the Steppe occurred in RPUs 13 and 19 (Appendix Tables 57 and 58). Production in RPU13 was rainfed, with net earnings of -91 SL/100 kg, while production in RPU19 was irrigated, with net earnings of -68 SL/100 kg.

Results of plotting on a graph the proportions of the nation's total lentil production produced at the various cost levels by RPU are found in Fig. 4. According to these estimates, about 95 percent of the total production was produced at a variable cost of 83 SL or less, the average price received for lentils by farm holders surveyed. However, only about 72 percent of the total production was produced at a total cost of 83 SL or less, reflecting a rather high usage of family labor.

The Value of lentil by-products generally doubled the imputed family labor costs in all producing regions except for the Coast, Euphrates and Tributaries, and Steppe Regions where the family labor costs about equalled the by-product values.

Chickpeas

Only the Mountain, Lowlands and Southwest Regions produced chickpeas to any significant extent, according to farm survey results. On the basis of total production, the Southwest was the most important chickpea producing region by far (Table 5).

Produced almost totally under rainfed conditions, chickpea yields at the national level average 58 kg per dunom. The average price holders received per 100 kg was 312 SL, about double the government announced price, and government purchases amounted to less than one percent of total production. Total variable costs for the nation was 51 SL per dunom and 112 SL per 100 kg, resulting in exceptionally high gross margins and net earnings of 224 SL and 209 SL per 100 kg., respectively.

Both variable and total costs of producing chickpeas were lowest per 100 kg among producers in the Southwest. Similarly gross margins and net earnings were highest. Although net earnings were about half as much in the other two regions resulting mainly from the lower yields and value per 100 kg, the returns still appear to be quite high.

Chickpea production in the Southwest, all rainfed, occurred in RPUs4 5, 9 and 15 (Appendix Tables 55 and 56). The highest net earnings were found in RPU5 at 263 SL/100 kg, while the lowest, 71 SL/100 kg were found in RPU4. Returns to producers in the region as a whole appeared to be higher for the smaller farms than for the larger farms.

Over one-third of the nation's total dunoms of chickpeas, but only one-fifth of the total production, occurred in the Mountain Region. In only RPU36, however, did farm holders report chickpea production (Appendix

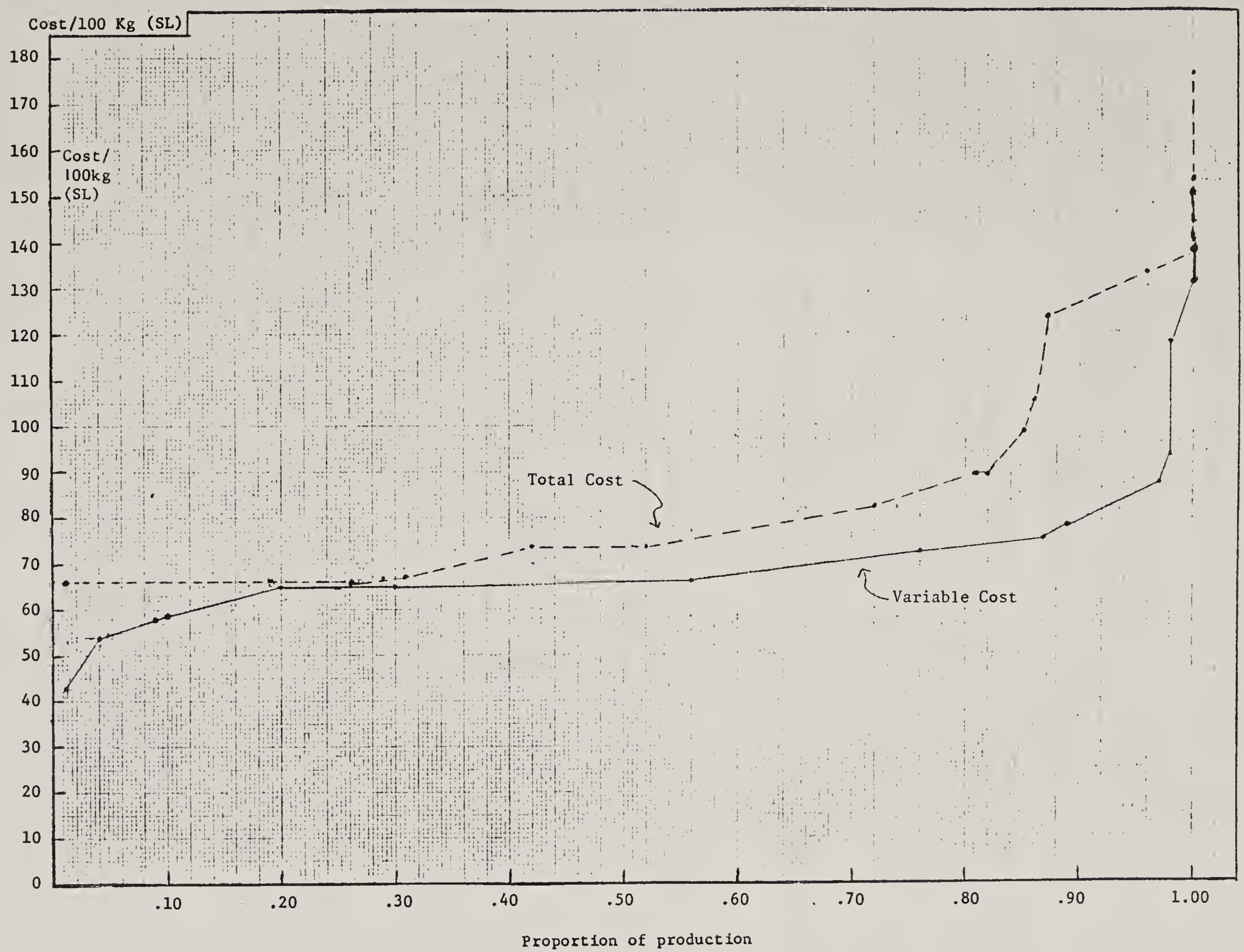

Figure IV-4. Cumulation of Lentils Production by Cost Levels, Cropyear 1977-1978, SAR

Table IV-5. Estimated Production Costs and Returns in For Chickpeas By Region, Cropyear 1977-1978, S.A.R.

Item	Coast	Moun- tain	Low- lands	Undul. Plains	Euph. and Trib.	North- east	South- west	Steppe	S.A.R.
Irr. (Pct.) 1/	-	0	0	-	-	-	0	-	0
Per Dunom: 2/									
Prod. (Kg)	-	36	44	-	-	-	71	-	58
Value of Prod. (SL)	-	89	92	-	-	-	225	-	172
Var. Costs (SL)									
Seed	-	18	18	-	-	-	25	-	22
Org. Fert.	-	0	0	-	-	-	0	-	0
Min. Fert.	-	7	5	-	-	-	0	-	3
Pest.	-	0	1	-	-	-	0	-	0
Pack.	-	2	2	-	-	-	1	-	1
H. Labor	-	13	10	-	-	-	9	-	10
Animal Power	-	0	0	-	-	-	3	-	2
Tractor Power	-	4	5	-	-	-	13	-	10
Other	-	0	0	-	-	-	3	-	2
Total	-	44	41	-	-	-	54	-	50
Rent Paid	-	0	0	-	-	-	2	-	1
Tot. Var. + Rent	-	44	41	-	-	-	56	-	51
Family Labor 3/	-	3	4	-	-	-	13	-	9
Total	-	47	45	-	-	-	69	-	60
Gross Margin 4/	-	45	51	-	-	-	169	-	121
Net Earnings 5/	-	42	47	-	-	-	156	-	112
Per 100 kg (SL): 6/									
Value of Prod.	-	249	211	-	-	-	335	-	312
Var. Cost	-	122	93	-	-	-	76	-	121
Var. Cost + Rent	-	122	93	-	-	-	79	-	112
Family Labor 3/	-	8	6	-	-	-	18	-	15
Total Cost	-	130	99	-	-	-	97	-	127
Gross Margin 4/	-	127	118	-	-	-	256	-	224
Net Earnings 5/	-	119	112	-	-	-	238	-	209

1/ Proportion of holders reporting
2/ Weighted by total number of dunoms
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost and rent
5/ Value of production less total cost
6/ Weighted by total production

Tables 59 and 60). Produced under rainfed conditions, gross margin and net earnings amounted to 127 SL and 119 SL/100 kg, respectively. Both gross margin and net earnings were highest for the larger-sized farms.

Chickpeas in the Lowlands made up about 5 percent of the nation's total dunoms in this crop and the total production. Holders only in RPU26 reported chickpea production during the crop year 1977-1978. All produced under rainfed conditions, gross margin and net earnings per 100 kg totaled 118 SL and 112 SL, respectively.

According to the graph of the proportion of total chickpeas produced at different levels of variable and total costs, it is apparent that government announced prices and prices received by producers greatly exceeded these costs (Fig. 5). Even at two-thirds of the government announced price 165 SL per 100 kg, over 80 percent of the total production would have its variable costs covered, although only about 60 percent of the total production would have its total costs covered.

Chickpea by-product value reportedly existed in only the Southwest Region, where they were slightly less than the imputed value of family labor.

Cotton

Almost all of the cotton produced by the farm holders surveyed was irrigated (Table 6). While some cotton was produced in all regions except the Coast and Mountains, the bulk of the production came from the Euphrates and Tributaries Region and the Northeast. For the nation as a whole, cotton yields were 235 kg per dunom, with an average reported value of 155 SL per 100 kg. The high variable costs per dunom reflect higher uses of fertilizers and pesticides than for any other crops except sugar beets. Tractor and hired labor costs also were quite high, resulting in a total variable cost of 159 SL per dunom and 66 SL per 100 kg. Adding in rent paid and the estimated value of unpaid family labor resulted in total costs of 220 SL per dunom and 91 SL per 100 kg. Net earnings at the national level amounted to 162 SL per dunom and 64 SL per kg.

Total cost of production per 100 kg was lower in the Euphrates and Tributaries Region than in other regions, while net earnings per kg were highest. The Northeast fared somewhat less well, accounted for in part by higher family labor cost. While producers in the Steppe earned the next highest level of net earnings per 100 kg, cotton production here relative to total production was quite low.

Low yields in the Lowlands resulted in high per 100 kg costs of production and the lowest gross margins and net earnings of all the cotton producing regions.

According to survey results, approximately 57 percent of Syria's total dunoms in cotton and 62 percent of the total production were found in the Euphrates and Tributaries Region. All three RPUs in the region had cotton production, all irrigated. Total costs per 100 kg were lowest, 76 SL, and

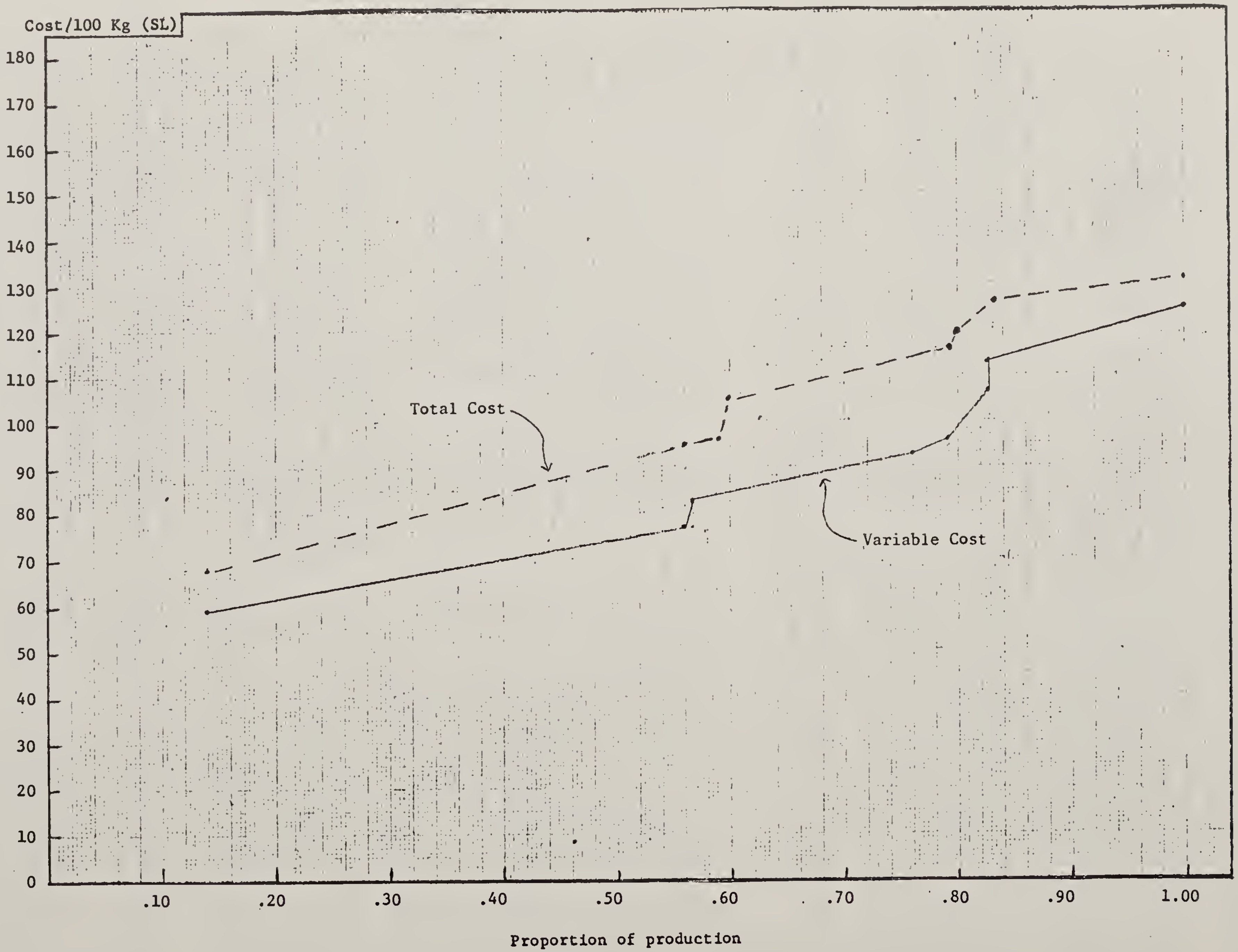

Figure IV-5. Cumulation of Chickpeas Production by Cost Levels, Cropyear 1977-1978, SAR

Table IV-6. Estimated Production Costs and Returns in For Cotton By Region, Cropyear 1977-1978, S.A.R.

Item	Coast	Moun-tain	Low-lands	Undul. Plains	Euph. and Trib.	North-east	South-west	Steppe	S.A.R.
Irr. (Pct.) 1/	-	-	99	100	100	100	100	100	100
Per Dunom: 2/									
Prod. (Kg)	-	-	147	246	265	204	260	218	235
Value of Prod. (SL)	-	-	238	400	411	392	432	329	382
Var. Costs (SL)									
Seed	-	-	5	7	7	6	3	6	6
Org. Fert.	-	-	2	8	1	0	0	4	1
Min. Fert.	-	-	37	30	30	26	15	20	29
Pest.	-	-	4	6	4	4	15	7	5
Pack.	-	-	5	7	9	9	14	8	8
H. Labor	-	-	40	81	32	36	40	27	35
Animal Power	-	-	8	18	5	4	4	6	5
Tractor Power	-	-	27	5	23	41	29	35	26
Other	-	-	65	66	47	30	57	12	44
Total	-	-	193	228	158	156	177	125	159
Rent Paid	-	-	0	2	3	0	0	0	2
Tot. Var. + Rent	-	-	193	230	161	156	177	125	161
Family Labor 3/	-	-	45	23	51	96	82	66	59
Total	-	-	238	253	212	252	259	191	220
Gross Margin 4/	-	-	45	170	250	236	255	204	221
Net Earnings 5/	-	-	0	147	199	140	173	138	162
Per 100 kg (SL): 6/									
Value of Prod.	-	-	162	162	155	149	166	158	155
Var. Cost	-	-	132	89	60	59	68	58	66
Var. Cost + Rent	-	-	132	93	61	59	68	58	67
Family Labor 3/	-	-	30	10	19	34	31	30	24
Total Cost	-	-	162	103	80	93	99	88	91
Gross Margin 4/	-	-	30	69	94	90	98	100	88
Net Earnings 5/	-	-	0	59	75	56	67	70	64

1/ Proportion of holders reporting
2/ Weighted by total number of dunoms
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost and rent
5/ Value of production less total cost
6/ Weighted by total production

net earnings highest, 81 SL/100 kg, for producers in RPU32 (Appendix Tables 69 and 70). Yield was lower in RPU42 and net earnings, at 68 SL/100 kg, were lower than for producers in the other RPUs. Net earnings exhibited a definite increase as farm size increased, for the region as a whole.

The Northeast accounted for about 16 percent of Syria's total dunoms of cotton and total production. All grown under irrigation, cotton was produced in all RPUs in the region except RPUs38, 54 and 55. Although total cost of production per 100 kg was lowest in RPU45 at 65 SL, net earnings per 100 kg were highest in RPU 46 at 90 SL (Appendix Tables 71 and 72). Total cost per 100 kg was highest in RPU41, which also had the lowest net earnings at 49 SL/100 kg. There was a tendency in the region for larger farms to earn higher returns.

About 13 percent of the nation's total land planted to cotton and 8 percent of the total production occurred in the Lowlands Region. Produced for the most part under irrigation, production was reported by holders in RPUs26 and 34 (Appendix Tables 65 and 66). Total cost per 100 kg was lower in RPU26 than in RPU34, in part because of high family labor cost. Net earnings amounted to 45 SL/100 kg in PRU26, while net earnings dropped to -13 SL/100 kg for producers in RPU34. No small-sized farms in the region raised cotton, and the medium-sized farms had higher gross margins and net earnings than the large-sized farms.

Cotton production in the Steppe approached 10 percent of the nation's total dunoms in cotton and total production. All grown under irrigation, production occurred in RPUs19, 31 and 41 (Appendix Tables 75 and 76). Total costs were lowest, at 82 SL/100 kg in RPU31, where net earnings were also highest, also at 82 SL/100 kg.

Highest total cost, 127 SL/100 kg, occurred in RPU19, which also had the lowest net earnings, 51 SL/100 kg. A definite pattern of increasing returns as farm size increased existed in the region.

Holders in the Undulating Plains Region farmed about 3 percent of the nation's total dunoms in cotton, and production from this land accounted for about 8 percent of total production. Cotton production, according to survey results, was found in RPUs20, 49 and 57 (Appendix Tables 67 and 68). Total cost was lowest, 81 SL/100 kg for producers in RPU49, who also received the highest net earnings, 83 SL/100 kg. Lowest returns occurred in RPU57, which also had the lowest yields. No definite association between return levels and farm size appear to exist in the region.

The Southwest Region accounted for only about 3 percent of Syria's cotton area and production. In the farm survey, cotton production in the region was found only in RPU10. Total cost per 100 kg amounted to 99 SL, while net earnings were 67 SL/100 kg. The large-sized farms in the region reported the highest net earnings.

A look at the graph where the proportion of cotton production produced at different cost levels reveals that the government announced price of 183 SL per 100 kg of seed cotton considerably exceeded costs of production in all areas (Fig. 6). A price two-thirds this level would cover the variable costs of over 96 percent of the total cotton production and the total costs of about 91 percent of the total production.

Cotton by-product values were considerably less than inputed family labor costs in all producing regions except the Undulating Plains where the two were about equal. These values were about half of the family labor costs in the Euphrates and Tributaries Region, one-third in the Steppe, one-fourth in the Southwest, and only one-tenth in the Northeast.

Sugar Beets

While sugar beet production reported in the farm survey encompassed three regions, the Lowlands and Euphrates and Tributaries Regions produced most all of the total production reported. Grown under irrigation, sugar beet yields averaged 2330 kg per dunom, with the average price per 100 kg being 11 SL, somewhat less than the government announced price. Variable costs included proportionally high expenditures for fertilizer as compared with other crops. Variable cost totaled 223 SL per dunom and 10 SL per 100 kg at the national level, with total costs of 345 SL and 14 SL, respectively. Gross margin per dunom was 59 SL and per 100 kg was one SL, and net earnings were -63 SL and -3 SL, respectively (Table 7).

The Lowlands Region accounted for 64 percent of Syria's total land in sugar beets and 95 percent of the total production, according to survey results. Only the farms surveyed in RPU34 produced sugar beets, all under irrigation. Total cost per 100 kg reached 14 SL, leaving net earnings of -5 SL/100 kg (Appendix Tables 77 and 78). Sugar beet production was about a break-even crop enterprise at the gross margin level of returns. Medium-sized farms fared somewhat better in returns than the other-sized farms, although net earnings were still -1 SL/100 kg.

While the Euphrates ad Tributaries Regions encompassed 35 percent of the total dunoms in sugar beets nation-wide, low yields results in a production of only 4 percent of the national total. Only producers in RPU32 reported sugar beet production, all under irrigation. Total cost per 100 kg amounted to 15 SL, while gross margin was 6 SL/100 kg and net earnings were -2 SL/100 kg (Appendix Tables 79 and 80). No small farms in the region reported sugar beet production, and the medium-sized farms lost less in net earnings than the large-sized farms, despite having higher family labor costs.

Sugar beet by-product values were reported at 5-7 SL per dunom in the Lowlands Region, much less than family labor charges. About 20 SL per dunom was the value reported in the Euphrates and Tributaries Region, still much less than the family labor charge. In the Steppe by-product value was a reported 35 SL per dunom.

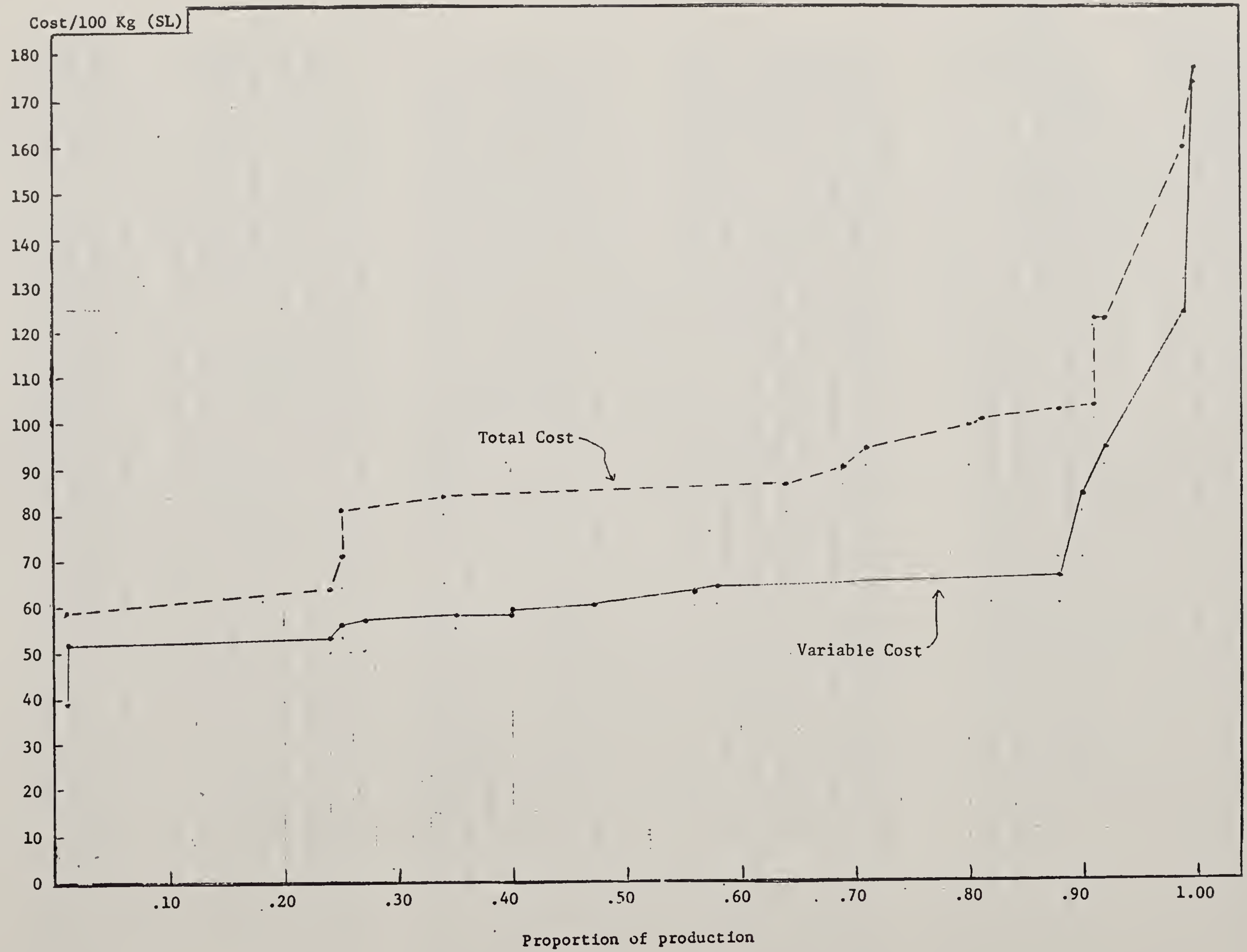

Figure IV-6. Cumulation of Cotton Production by Cost Levels, Cropyear 1977-1978, SAR

Table IV-7. Estimated Production Costs and Returns in For Sugar Beets By Region, Cropyear 1977-1978, S.A.R.

Item	Coast	Moun-tain	Low-lands	Undul. Plains	Euph. and Trib.	North-east	South-west	Steppe	S.A.R.
Irr. (Pct.) 1/	-	-	100		100	-	-	100	100
Per Dunom: 2/									
Prod. (Kg)	-	-	2548		1938	-	-	2000	2330
Value of Prod. (SL)	-	-	298		252	-	-	240	282
Var. Costs (SL)									
Seed	-	-	13		4	-	-	30	10
Org. Fert.	-	-	0		0	-	-	0	0
Min. Fert.	-	-	54		121	-	-	21	77
Pest.	-	-	5		0	-	-	0	3
Pack.	-	-	0		0	-	-	0	0
H. Labor	-	-	107		0	-	-	53	69
Animal Power	-	-	42		0	-	-	0	27
Tractor Power	-	-	15		12	-	-	38	14
Other	-	-	28		15	-	-	98	23
Total	-	-	264		148	-	-	240	223
Rent Paid	-	-	0		0	-	-	0	0
Tot. Var. + Rent	-	-	264		148	-	-	240	223
Family Labor 3/	-	-	110		146	-	-	0	122
Total	-	-	374		294	-	-	240	345
Gross Margin 4/	-	-	34		104	-	-	0	59
Net Earnings 5/	-	-	-76		-42	-	-	0	-63
Per 100 kg (SL): 6/									
Value of Prod.	-	-	11		13	-	-	12	11
Var. Cost	-	-	10		7	-	-	12	10
Var. Cost + Rent	-	-	10		7	-	-	12	10
Family Labor 3/	-	-	4		8	-	-	0	4
Total Cost	-	-	14		15	-	-	12	14
Gross Margin 4/	-	-	1		6	-	-	0	1
Net Earnings 5/	-	-	-3		-2	-	-	0	-3

1/ Proportion of holders reporting
2/ Weighted by total number of dunoms
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost and rent
5/ Value of production less total cost
6/ Weighted by total production

Tobacco

Survey results indicate that most of the tobacco was grown in the Mountain Region, with only about 10 percent of the operators reporting irrigation (Table 8). National cost and returns figures, heavily weighted both in area planted and in total production in the Mountain Region, resulted in practically the same costs and returns for the Mountain Region and for the Nation.

Tobacco yield per dunom in the Mountain Region amounted to 65 kg valued at 659 SL per 100 kg. Variable costs totaled 134 SL per dunom and 207 SL per 100 kg. Seed, fertilizer and pesticides were important components of variable costs. Family labor costs per 100 kg exceeded variable costs, the combined total being 541 SL.

Gross margin per 100 kg from tobacco production in the Mountain Region was 452 SL, while the relatively high family labor cost reduced net earnings to 118 SL per 100 kg.

Per dunom yields of tobacco were much higher for the irrigated farms in the Coast, as were variable and total costs, however, net earnings per 100 kg were slightly less than for farms in the Mountain Region. Net earnings per 100 kg in the Lowlands were the lowest of the three regions.

Almost 98 percent of the total dunoms in tobacco and 95 percent of the total production occurred in the Mountain Region. Farmers in all RPUs except RPUs29 and 37 reported tobacco production. Lowest total cost, 457 SL/100 kg occurred in RPU36, which also had the highest net earnings, 170SL/100 kg (Appendix Tables 85 and 86). Highest total cost was in RPU30, where farmers had the lowest net earnings, 95 SL/100 kg. Higher gross margins resulted among small farms in the region, while high family labor costs for these farms place the medium-sized farms at a higher net earnings position.

The Lowlands Region had less than 2 percent of the total dunoms and total production, this occurring only in RPU35, according to survey results. Only small-sized farms raised tobacco. Total cost was 462 SL/100 kg. and net earnings were 90 SL/100 kg (Appendix Tables 87 and 88).

Farmers in the Coastal Region had only one percent of the total dunoms and 3 percent of the total production nation-wide. Only medium-size farms produced tobacco, the total cost amounting to 490 SL/100 kg and net returns 110 SL/100 kg.

Peanuts

Peanuts, according to the farm survey results, were produced almost wholly in the Coast Region, although a few farm holders interviewed in the Steppe raised peanuts. All the holders reporting peanut enterprises used irrigation water (Table 9). Yields, costs and returns in the Coast closely paralleled those in the Nation as a whole, for the Steppe had such a small proportion of the total dunoms and total production of peanuts.

Table IV-8. Estimated Production Costs and Returns in For Tobacco By Region, Cropyear 1977-1978, S.A.R.

Item	Coast	Moun-tain	Low-lands	Undul. Plains	Euph. and Trib.	North-east	South-west	Steppe	S.A.R.
Irr. (Pct.) 1/	100	10	33	-	-	-	-	-	11
Per Dunom: 2/									
Prod. (Kg)	217	65	33	-	-	-	-	-	67
Value of Prod. (SL)	1302	427	546	-	-	-	-	-	437
Var. Costs (SL)									
Seed	63	47	50	-	-	-	-	-	47
Org. Fert.	0	0	0	-	-	-	-	-	0
Min. Fert.	33	18	30	-	-	-	-	-	18
Pest.	0	5	2	-	-	-	-	-	5
Pack.	16	2	0	-	-	-	-	-	2
H. Labor	13	20	40	-	-	-	-	-	20
Animal Power	65	27	0	-	-	-	-	-	27
Tractor Power	16	6	0	-	-	-	-	-	6
Other	48	9	10	-	-	-	-	-	10
Total	254	134	132	-	-	-	-	-	135
Rent Paid	0	0	0	-	-	-	-	-	0
Tot. Var. + Rent	254	134	132	-	-	-	-	-	135
Family Labor 3/	809	216	326	-	-	-	-	-	223
Total	1063	350	458	-	-	-	-	-	358
Gross Margin 4/	1048	293	414	-	-	-	-	-	302
Net Earnings 5/	239	77	88	-	-	-	-	-	79
Per 100 kg (SL): 6/									
Value of Prod.	600	659	552	-	-	-	-	-	655
Var. Cost	117	207	133	-	-	-	-	-	202
Var. Cost + Rent	117	207	133	-	-	-	-	-	202
Family Labor 3/	373	334	329	-	-	-	-	-	335
Total Cost	490	541	462	-	-	-	-	-	537
Gross Margin 4/	483	452	419	-	-	-	-	-	453
Net Earnings 5/	110	118	90	-	-	-	-	-	118

1/ Proportion of holders reporting
2/ Weighted by total number of dunoms
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost and rent
5/ Value of production less total cost
6/ Weighted by total production

Table IV-9. Estimated Production Costs and Returns in For Peanuts By Region, Cropyear 1977-1978, S.A.R.

Item	Coast	Moun-tain	Low-lands	Undul. Plains	Euph. and Trib.	North-east	South-west	Steppe	S.A.R.
Irr. (Pct.) 1/	100	-	-	-	-	-	-	100	100
Per Dunom: 2/									
Prod. (Kg)	130	-	-	-	-	-	-	174	133
Value of Prod. (SL)	285	-	-	-	-	-	-	289	285
Var. Costs (SL)									
Seed	49	-	-	-	-	-	-	48	49
Org. Fert.	0	-	-	-	-	-	-	0	0
Min. Fert.	31	-	-	-	-	-	-	12	30
Pest.	1	-	-	-	-	-	-	0	1
Pack.	0	-	-	-	-	-	-	7	0
H. Labor	1	-	-	-	-	-	-	0	
Animal Power	25	-	-	-	-	-	-	8	24
Tractor Power	7	-	-	-	-	-	-	5	7
Other	63	-	-	-	-	-	-	44	62
Total	177	-	-	-	-	-	-	124	174
Rent Paid	12	-	-	-	-	-	-	0	11
Tot. Var. + Rent	189	-	-	-	-	-	-	124	185
Family Labor 3/	78	-	-	-	-	-	-	166	84
Total	267	-	-	-	-	-	-	290	269
Gross Margin 4/	96	-	-	-	-	-	-	165	100
Net Earnings 5/	18	-	-	-	-	-	-	- 1	16
Per 100 kg (SL): 6/									
Value of Prod.									
Var. Cost	222	-	-	-	-	-	-	166	217
Var. Cost + Rent	139	-	-	-	-	-	-	71	133
Family Labor 3/	148	-	-	-	-	-	-	71	141
Total Cost	59	-	-	-	-	-	-	96	62
Gross Margin 4/	207	-	-	-	-	-	-	167	203
Net Earnings 5/	74	-	-	-	-	-	-	95	76
	15	-	-	-	-	-	-	-1	14

1/ Proportion of holders reporting
2/ Weighted by total number of dunoms
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost and rent
5/ Value of production less total cost
6/ Weighted by total production

Yields per dunom in the Coast amounted to 130 kg, with value of production being 222 SL per 100 kg. Total variable cost per dunom was 177SL per dunom, including relatively high expenditures for seed, fertilizer, animal power, and other costs items. Adding in family labor costs resulted in a total cost per dunom of 267 SL. Resulting gross margins were 96 SL per dunom and 74 SL per 100 kg, while net earnings were 18 SL per dunom and 15 SL per 100 kg.

Although peanut yields in the Steppe were higher than those in the Coast and variable costs were lower per dunom and per kg, family labor costs were high enough to offset this advantage. This is revealed in the higher gross margins in the Steppe and the lower net earnings.

Over 93 percent of Syria's dunoms in peanuts and 91 percent of total production occurred in the Coastal Region (Appendix Tables 89 and 90). The remainder of the dunoms and production, according to survey results, occurred on irrigated farms in the Steppe (Appendix Tables 91 and 92).

C. Costs and Returns--Uncontrolled Crops

The remainder of the crops on which costs and returns data were obtained during the farm survey are those, for the most part, uncontrolled by the government. These crops have been grouped in this analysis into vegetable crops, tree and vine crops, and other crops. In the survey, none of these crops appeared with any regularity in more than five regions. The number of observations in any region for each crop was limited and details on inputs were scanty. However, the information on variable and total costs and on returns indicate relative feasibility of some alternative enterprises in some regions.

Vegetable Crops

Most all vegetable crops recorded during the farm survey were irrigated (Table 10). Exceptions included watermelons in all regions, cucumbers in the Undulating Plains, and potatoes in the Mountain Region.

Dry onions, produced under irrigation according to survey results, appeared mainly in the Lowlands and Steppe, and to a lesser extent in the Coastal Region. Producers in the Coast had the highest yields, and lowest variable and total costs of production, resulting in exceptionally high returns per dunom.

The Lowlands accounted for over one-third of the total number of dunoms recorded in the survey. Total cost per dunom amounted to 574 SL, while net earnings were 122 SL/dunom. RPU34 was the only RPU in the Lowlands in which farmers reported dry onion production (Appendix Table 93).

The Steppe, with dry onion production occurring in RPUs19 and 41, accounted for over 26 percent of the total dunoms in this crop. Total cost was higher in RPU41 than in RPU19, although net earnings reached 274 SL in RPU41 as opposed to -91 SL/dunom in RPU19 (Appendix Table 93).

Table IV-10. Estimated Production Costs and Returns for Vegetable Crops By Region, Cropyear 1977-1978, S.A.R.

Crop and Region	Extent of Irrigation 1/	Yield (Kg/ Dunom)	Production Costs and Returns					
			Value of Production	Variable Cost	Value of Family Labor 2/	Total Cost	Gross Margin 3/	Net Earnings 4/
			S.L. Per Dunom 5/					
Dry Onions:								
Coastal	100	2478	1487	364	62	426	1123	1061
Lowlands	100	1988	696	526	48	574	170	122
Steppe	100	962	656	465	87	552	191	104
Cucumbers:								
Coastal	84	758	518	261	145	406	257	112
Undul. Pl.	0	225	153	30	67	97	123	56
Tomatoes:								
Coastal	75	1927	1155	441	250	691	714	464
Mountain	38	474	249	104	200	304	145	-55
Euph. & T.	100	1977	1180	395	617	1012	785	168
Southwest	100	2698	1092	497	112	609	595	483
Steppe	100	648	277	282	32	314	- 5	-37
Potatoes:								
Mountain	0	113	96	43	94	137	53	-41
Lowlands	100	377	245	467	85	552	-222	-307
Undul. Pl.	100	609	435	340	62	402	95	33
Southwest	66	684	1012	712	172	884	300	128
Eggplant:								
Coastal	100	1898	813	617	363	980	196	-167
Mountain	100	997	381	181	276	457	200	- 76

(Continued)

Table IV-10.(CONT) Estimated Production Costs and Returns for Vegetable Crops By Region, Cropyear 1977-1978, S.A.R.

Crop and Region	Extent of Irrigation 1/	Yield (Kg/ Dunom)	Production Costs and Returns					
			Value of Production	Variable Cost	Value of Family Labor 2/	Total Cost	Gross Margin 3/	Net Earnings 4/
			S.L. Per Dunom 5/					
Watermelons:								
Mountain	0	81	23	16	22	38	7	-15
Lowlands	0	190	43	16	15	31	27	12
Undul. Pl.	0	292	57	21	7	28	36	29

1/ Proportion of holders reporting
2/ Imputed value of unpaid family labor
3/ Value of production less variable cost
4/ Value of production less total cost
5/ Weighted by total number of dunoms

The Coastal Region, accounting for the remaining dry onion dunoms, had a high yield of 2,478 kg/dunom, a total cost of 426 SL/dunom, and net earnings of 1,061 SL/dunom.

Cucumbers appeared in importance primarily in the Coast and Undulating Plains, although over 90 percent of the land in cucumbers, as estimated from the survey, occurred in the Coastal Region. Yields, costs and returns were higher per dunom for the largely irrigated Coastal production than for production in the Undulating Plains (Table 10). The actual cost per dunom was 406 SL, reflecting a high family labor cost, while net earnings were 112 SL. Cucumber production in the Undulating Plains occurred in RPU38, where total cost was 97 SL, again reflecting high family labor cost relative to variable cost (Appendix Table 94). Net earnings were 56 SL/dunom.

Tomatoes, with from 38 percent to 100 percent of the producers reporting irrigation of this crop, occurred with some regularity in five regions, although most of the land in tomatoes was located in the Southwest, Euphrates and Tributaries Region and the Coast. Highest per dunom variable costs were found in the Southwest, while highest total costs, related to high imputed family labor costs, were found in the Euphrates and Tributaries Region (Table 10). Only among producers in the Steppe were variable costs not covered by value of product sold, while both in this region and in the Mountain Region net earnings were negative. Highest net earnings were received by producers in the Southwest.

In the Southwest, which had over half of the total dunoms reported in all regions, the RPUs with farmers involved in tomato production included RPUs3, 10 and 15 (Appendix Table 95). All operators in these RPUs reported irrigated production. Highest per dunom yield, total cost, and returns, 499 SL, occurred in RPU3 and the lowest yield in returns, 16 SL net earnings, in RPU10. In the Euphrates and Tributaries Region, accounting for one-quarter of the total dunoms, farmers only in RPU32 reported tomato production (Appendix Table 95). High family labor costs resulted in net earnings of 168 SL/dunom. Net earnings in the Coastal Region, which had 16 percent of the total dunoms in tomatoes, amounted to 464 SL. Only slightly more than 3 percent of the total dunoms of tomatoes reported in the survey occurred in RPUs29, 30 and 36 of the Mountain Region. Largely rainfed production, the low yields and relatively high family labor cost resulted in net earnings of from -31 SL/dunom in RPU30 to 141 SL/dunom in RPU29 (Appendix Table 95). Slightly more than 2 percent of the total dunoms in tomatoes were recorded in RPUs19 and 41 of the Steppe. Although irrigated, yields were low and net earnings were -12 SL/dunom in RPU19 and -81 SL in RPU41.

Potatoes were grown, according to survey results, in the Undulating Plains, Southwest and Lowlands Region, and occurred only incidentially in the Mountain Region (Table 10). Highest variable and total costs, reflecting irrigation, were experienced by producers in the Southwest, although the higher prices received and higher yields resulted in gross margin and net earnings being the highest of the four regions. The Undulating Plains

with the next highest yield was the only other region in which producers received positive net earnings. Lower yields despite irrigation and lower prices received created a considerable loss for farm holders in the Lowlands.

Almost 40 percent of the total dunoms in potatoes were reported in the Undulating Plains, although the only RPU where potatoes were reported in the region was RPU23 (Appendix Table 96). Produced under irrigation net earnings total 33 SL/dunom. Somewhat less than one-third of the total dunoms in potatoes were located in RPUs9 and 16 of the Southwest. Net earnings were lower for the irrigated production in RPU9, at -182 SL/dunom, than for the largely irrigated production in RPU16. where net earnings were 136 SL/dunom (Appendix Table 96). With over one-quarter of the total dunoms of potatoes reported in RPUs34 and 35 of the Lowlands. all under irrigation, net earnings were -315 SL/dunom for RPU34 and -317 SL for RPU35. Potatoes production in the Mountain Region accounted for about one percent of the total dunoms in potatoes. Only RPUs29 and 30 were involved in this rainfed enterprise. Net earnings amounted to 71 SL/dunom in RPU29 and -55 SL in RPU30.

Eggplants, all produced under irrigation, appeared to be significant only in the Coastal and Mountain Regions, with the Coast having about twice the land area in eggplants. Yields in the Coast were about double those of the Mountain Region (Table 10). While gross margins were relatively high in both regions, high imputed values for family labor resulted in negative net earnings for both sets of producers. The Coastal Region, which had almost half of the total dunoms in eggplants, recorded 196 SL/dunom in total cost, and -167 SL/dunom in net earnings (Appendix Table 97). Producers in RPU30 of the Mountain Region had a gross margin of 288 SL/dunom, although high family labor cost reduced net earnings to -100 SL/dunom. Producers in RPU36 of the Mountain Region experienced lower yields, and although gross margin was positive, net earnings were -32 SL/dunom.

Watermelons, important in the Mountain, Lowlands and Undulating Plains Regions, were produced without irrigation. Yields were higher in the Undulating Plains. as were variable costs per dunom (Table 10). These higher yields and lower family labor costs resulted in high returns for these producers than for those in the other regions. Producers in the Mountain Region, with the lowest yields and highest family labor costs per dunom, received the lowest returns. Watermelons were produced only in RPU58 of the Mountain Region, RPU26 in the Lowlands, and RPU38 of the Undulating Plains according to survey results (Appendix Table 98). Net earnings were highest, at 29 SL/dunom, in RPU38.

Tree and Vine Crops

Grapes, irrigated to any extent only in the Steppe, were recorded during the farm survey in four regions (Table 11). Most of the land devoted to grape production occurred in the Southwest and Undulating Plains, and to a lesser extent in the Steppe and Mountain Regions. Yields were highest in the Steppe, as were cost and returns. The more important grape

Table IV-11. Estimated Production Costs and Returns for Tree and Vine By Region, Cropyear 1977-1978, S.A.R.

Crop and Region	Extent of Irrigation 1/	Yield (Kg/ Dunom)	Production Costs and Returns					
			Value of Production	Variable Cost	Value of Family Labor 2/	Total Cost	Gross Margin 3/	Net Earnings 4/
			S.L. Per Dunom 5/					
Grapes:								
Mountain	0	38	27	11	19	30	16	-3
Undul. Pl.	1	70	34	24	10	34	10	0
Southwest	0	223	187	27	36	63	160	124
Steppe	26	365	401	142	102	244	259	157
Olives:								
Coastal	0	155	294	55	39	94	239	200
Mountain	0	66	106	32	36	68	74	38
Lowlands	35	234	233	49	10	59	184	174
Undul. Pl.	3	39	73	25	30	55	48	18
Southwest	54	96	291	43	34	77	248	214
Figs:								
Coastal	100	134	134	42	12	54	92	80
Mountain	16	135	121	62	43	105	59	16
Undul. Pl.	0	163	138	101	44	145	37	-7
Southwest	0	181	175	36	52	88	139	87
Apples:								
Southwest	100	151	289	141	69	210	148	79
Apricots:								
Mountain	0	241	308	224	58	282	84	26
Southwest	100	310	242	126	104	230	116	12
Steppe	100	391	241	112	92	204	129	37

(Continued)

Table IV-11. (CONT) Estimated Production Costs and Returns for Tree and Vine By Region, Cropyear 1977-1978, S.A.R.

Crop and Region	Extent of Irrigation 1/	Yield (Kg/ Dunom)	Production Costs and Returns					
			Value of Production	Variable Cost	Value of Family Labor 2/	Total Cost	Gross Margin 3/	Net Earnings 4/
			S.L. Per Dunom 5/					
Lemons:								
Coastal	0	571	571	339	143	482	232	89
Lowlands	95	299	265	211	23	234	54	31

1/ Proportion of holders reporting
2/ Imputed value of unpaid family labor
3/ Value of production less variable cost
4/ Value of production less total cost
5/ Weighted by total number of dunoms

producing region, the Southwest, experienced the next highest yields, costs and subsequently returns. Lowest returns were received by producers in the Undulating Plains, mainly because of the low yield. Grapes were recorded in the Southwest Region in RPUs4, 9 and 15, where together they made up over half of the nation's total dunoms in this crop. Net earnings were negative only in RPU4, while net earnings per dunom amounted to 131 SL in RPU9, and 128 SL in RPU15 (Appendix Table 99). Grape production was recorded in RPUs25, 27, 38 and 57 of the Undulating Plains, where together they accounted for over one-fifth of the total dunoms of grapes. Returns were positive, however, in only RPU57, where producers raised grapes under irrigation. The Steppe Region, with over 13 percent of the total denoms, had producers in RPUs13 and 17 who raised grapes. Those in RPU13 received higher net earnings, 281 SL/dunom, than did producers in any region where records were obtained. Accounting for less than 10 percent of the total dunoms, the Mountain Region had producers in RPUs29, 30, 36 and 37, with positive net earnings occurring only in RPU36.

Olives, more widely distributed than any of the tree and vine crops, occurred most significantly in the Lowlands and Mountains, and to a lesser extent in the Coastal, Undulating Plains and Southwest Regions. Only in the Southwest were olive orchards irrigated to any extent. Yields were highest in the Coastal and Southwest Regions, which had the highest costs but also the highest gross margin and net earnings per dunom (Table 11). Higher prices received for olives in these regions also enhanced returns. Lowest returns per dunom were received by producers in the Mountain and Undulating Plains Regions, which had the lowest yields. Net earnings per dunom were highest in RPU3 of the Southwest, 327 SL, where operators irrigated their orchards (Appendix Table 100). However, the next highest net earnings, 283 SL/dunom, were experienced by farm holders in RPU4 of the Southwest, who practiced rainfed farming. Relatively high net earnings also occurred in RPUs47 of the Lowlands, 15 of the Southwest, 28 of the Coastal Region, and 26 of the Lowlands.

Figs, produced mainly in four regions, as revealed in the survey results, were of more frequent occurences in the Southwest, Undulating Plains and Mountains than in the Coastal Region. Yields reported in all regions were quite comparable (Table 11). Despite higher family labor costs per dunom, yields were high enough and variable costs low enough to obtain the highest net earnings in the Southwest. Relatively low variable cost per dunom and low family labor costs, together with the slightly higher prices received, result in the next highest net earnings for producers in the Coastal Region. Only in the Undulating Plains, with the lowest price received for figs, the highest variable cost, and the next highest family labor costs were net earnings negative.

The highest net earnings per dunom for figs, 96 SL, occurred in RPU15 of the Southwest, the region where over half of the total dunoms in figs occurred (Appendix Table 101). High net earnings also occurred in RPU28 of the Coastal Region, 80 SL/dunom. Negative returns because of no yield occurred in RPU25 of the Undulating Plains, the total dunoms in the RPU amounting to over one-fifth of all reported in the survey. The Mountain

Region had one-fifth of the total denoms also, while net returns ranged from -56 SL/dunom in RPU29 to 32 SL/dunom in RPU37.

Apples were reported to any significant degree during the farm survey only in the Southwest. All producers surveyed reported irrigation for their apple orchards. Although no comparison can be made here among regions in apple production costs and returns, the returns appear to be suitable (Table 11). Within the region, apple production was reported only in RPU16, where net earnings received amounted to 79 SL/dunom (Appendix Table 102).

Apricots were reported during the survey primarily in the Southwest and to lesser extents in the Mountain and Steppe Regions. With irrigation being practiced in the Southwest and Steppe, yields were consequently higher, although costs per dunom were lower (Table 11). Net earnings per dunom were highest in the Steppe, while net returns were next highest in the Mountains despite the highest costs per dunom, mainly because the price received for apricots was higher than prices received in the other two regions. Highest net earnings occurred among farmers in RPU15 of the Southwest, the region having almost 60 percent of the total dunoms reported in the survey (Appendix Table 103). RPU13 of the Steppe had net earnings of 37 SL/dunom, while apricots in the Mountain Region's RPU36 produced net earnings of 26 SL/dunom. Only in RPU9 of the Southwest were net earnings negative, a result largely of high family labor cost.

Lemons, the only citrus fruit to show up in the survey of any consequence, appeared to be a significant enterprise in both the Coastal and Lowlands Regions, while most of the land in lemon trees occurred in the Lowlands. Lemon groves in the Lowlands for the most part were irrigated, although yields in the Coastal Region were considerably higher (Table 11). The higher yield and the higher price received, despite higher costs per dunom, resulted in the much higher returns to producers in the Coastal Region. RPU28 of the Coastal Region, with high family labor cost, had the higher total cost, with next earnings reaching 89 SL/dunom (Appendix Table 104). RPU35 of the Lowlands, the only other RPU in which producers reported lemon production, had net earnings per dunom of 31 SL.

Other Crops

Although cost and returns information were gathered on a number of other crops, only bitter vetch, sesame and maize were reported in sufficient abundance to warrant budgeting.

Rainfed production of bitter vetch occurred in the Undulating Plains. Southwest and Steppe, the Southwest being the most widely planted region (Table 12). Despite lower yields, higher prices for bitter vetch in the Steppe and lower costs resulted in a positive net earnings only in the Steppe. Production occurred in RPUs2, 5 and 15 of the Southwest, where low yield in RPU2 and high family labor cost in RPUs5 and 15 resulted in negative net earnings (Appendix Table 105). Relatively low prices received resulted in negative returns in RPU25 of the Undulating Plains. Only RPU13 in the Steppe had producers who reported bitter vetch production, the net earnings amounting to 8 SL/dunom.

Table IV-12. Estimated Production Costs and Returns for Other Crops By Region, Cropyear 1977-1978, S.A.R.

Crop and Region	Extent of Irrigation 1/	Yield (Kg/ Dunom)	Value of Production	Variable Cost	Value of Family Labor 2/	Total Cost	Gross Margin 3/	Net Earnings 4/
			Production Costs and Returns					
					S.L. Per Dunom 5/			
Bitter Vetch:								
Undul. Pl.	0	61	30	33	42	75	- 3	-45
Southwest	0	37	34	34	30	64	0	-30
Steppe	0	33	41	8	25	33	33	8
Sesame:								
Mountain	48	48	190	32	48	80	158	110
Euph. & T.	100	51	205	37	32	69	168	136
Maize:								
Lowlands	100	201	160	122	70	192	38	-32
Southwest	100	137	111	32	61	93	79	18
Steppe	100	94	102	43	136	179	59	-77

1/ Proportion of holders reporting
2/ Imputed value of unpaid family labor
3/ Value of production less variable cost
4/ Value of production less total cost
5/ Weighted by total number of dunoms

Sesame, produced in the Euphrates and Tributaries Region primarily, but also in the Mountain Region, for the most part irrigated, had relatively low production costs and highly favorably gross margins and net returns (Table 12). Irrigated production in RPU32 of the Euphrates and Tributaries Region had a net margin of 136 SL/dunom (Appendix Table 106). The two RPUs in the Mountain Region, where over one-fourth of the total sesame dunoms reported in the survey were located, had positive net earnings. RPU37, with no irrigation earned almost as much per dunom as RPU30, which for the most part produced irrigated sesame.

Maize cost and returns information were gathered primarily in the Lowlands, although some data were taken also in the Southwest and the Steppe Regions. All maize producers interviewed reported irrigated production of this crop. Costs were considerably higher on a per dunom basis in the Lowlands and the Steppe, and although yields were highest in the Lowlands, producers in both regions experienced positive gross margins but negative net margins (Table 12). Only producers in the Southwest, with lower costs per dunom, received positive net earnings. Maize production occurred in RPU34 of the Lowlands, where net earnings were -32 SL/dunom (Appendix Table 107). In the Southwest, RPU3 had net earnings of 30 SL/dunom, and RPU9 had producers who reported net earnings of -17 SL/dunom. Only RPU19 of the RPUs in the Steppe reported maize production, the net earnings being -77 SL/dunom.

D. Comparative Returns and Potential Adjustments

Highlights of potential crop adjustments in response to relative returns are discussed in this section. Mention is made of limitations to these adjustments posed by crop suitabilities and by governmental control programs. Another consideration is that the costs and returns data used are the results of only the one crop year, 1977-1978.

Coastal Region

Some 43 percent of the total land in crops in the region, according to the survey, was used for production of tree crops. Crop suitability ratings indicate a high potential for most of these crops. Considering the relative levels of returns from olives, composing 38 percent of the total cropland, additional land could be planted to this crop. With only three percent of the total cropland planted to lemons, this profitable crop could also be expanded, as could figs, which occupied less than one percent of the total cropland planted.

About 20 percent of the total land in crops in the region, as reported in the survey, was used to produce vegetable crops. High crop suitability ratings, rainfed and irrigated for vegetable crops, together with relatively high returns for dry onions, tomatoes, cucumbers, and to some extent eggplants, indicate a potential crop adjustment toward increasing the land area of the region planted to these crops.

Although local wheat and barley comprised 26 percent of the total cropland planted, returns were so low in relation to returns from vegetables and fruit that emphasis would be better placed on producing the latter groups of crops.

Mountain Region

According to survey results, about 6 percent of all the region's land in crops was planted to tobacco. Returns per dunom were high and exceeded returns for most other crops. Increases in hectarages planted would be limited, however, by the need to adopt erosion control practices, and the nature of governmental licensing and pricing programs.

Over 45 percent of the cropland planted in the region was in small grain. Limitations to continued cropping, considering erosion hazards, and the low returns from these crops, make further increases in area planted doubtful.

Tree crops, primarily olives, would be expected to remain in production, for returns are adequate. The land in tree crops amounted to over 36 percent of the total land in the region planted to all crops, according to survey results.

Sesame, comprising less than one percent of the total cropland planted, and chickpeas planted on about 8 percent of the cropland planted, offered the highest returns next to tobacco. Crop suitability ratings are high enough for increasing hectarages, although erosion control measures are a necessity.

Vegetables, apparently grown at a subsistence level, comprised less than one percent of the total cropland planted according to survey results. High family labor costs and erosion control requirements would limit any sizeable expansion in land planted to these crops.

Expansion of potato production through substitution for less profitable crops, such as cereals, lentils and tomatoes, would seem appropriate in RPU29, although erosion hazards would require additional land treatment. Sesame production could well be substituted for vegetable crops in RPU30, assuming erosion is controlled. Tobacco production could be profitably expanded in the same RPU if government programs so allow. At the same time, Mexican wheat would be a profitable substitution for local wheat and barley. While tobacco production could be profitably expanded in RPU36, subject to government controls, grapes, olives and apricots appeared to be more profitable, according to survey results, than vegetables or cereal crops. Sesame crop expansion in RPU37 through substitution for barley and lentils would be in order, while increased plantings of olives and figs would be a profitable adjustment. The same holds for crops in RPU58, except that tobacco, subject to controls, would be a profitable alternative on land less subject to erosion.

Lowlands Region

Production of small grains and chickpeas ranked satisfactorily in net earnings. These crops occupied about 45 percent of the total land in crops. With most of the land being suitable for rainfed or irrigated production of small grains, limits to increases in planted hectarage would rest with government allocations and announced prices.

Tree crops, primarily olives, accounted for a major part of the total land planted to crops in the Lowlands. Crop suitability ratings are high enough and returns sufficiently high for increases in hectarage planted. This would include lemons, which occupied only about one percent of the total cropland planted to crops in the region.

Although tobacco comprised less than one percent of the total cropland planted, according to survey results, returns were high enough to warrant consideration of increasing the hectarage devoted to this crop. Governmental programs would be the determining factor for this possible expansion.

Vegetables grown at the time of the survey amounted to over 10 percent of the total cropland planted to crops in the region. Crop suitability ratings are generally high enough and the returns sufficient to warrant expansion of hectarages of dry onions and watermelons, while potatoes production would require improved farming practices to reduce costs in order to justify expansion of plantings.

According to survey results, almost 5 percent of the total cropland planted in the Lowlands consisted of irrigated sugar beets. Production of this crop, subject to government controls, would likely be profitable only if labor requirements could be reduced further or product prices increased.

Irrigated cotton occupied about 6 percent of the region's total cropland planted. Because of high family labor costs, expansion of hectarage planted to this crop appears doubtful, despite adequate crop suitability ratings. Other restrictions placed on future expansion of cotton hectarage are crop allocations and pricing programs of the government.

In RPU26, Mexican wheat turned out to be more profitable than local wheat, barley, lentils or watermelons. At the same time olives appeared profitable, according to survey results, and could be expanded in dunoms planted. Chickpeas could be profitably expanded, as could cotton, both subject to governmental decisions regarding any increase. Watermelon production was more profitable than lentil production for the crop year studied. Among the crops surveyed in RPU34, only local and Mexican wheat and dry onions appeared to warrant increases in dunoms planted, the cereal crop expansion being dependent upon governmental decisions. Subject to these controls, tobacco planting could be profitably expanded in RPU35. Otherwise, olives and lemons appeared to be suitable for further expansion. Olives, profitable in RPU47, appeared to be the only such crop encountered in the survey.

Undulating Plains

Over 90 percent of the Undulating Plains Region's total cropland planted was planted to small grains according to survey results. Returns per hectare from these crops appeared satisfactory and ranked below only some of the minor crops. Returns from local and Mexican wheat were about even, although the largest proportion of the land in small grains was planted to barley. Other than low rainfall over sizeable proportions of the region which reduce crop suitabilities, government controls relative to hectarages planted would have a restricting effect on increases in hectarages of small grains.

Although farm survey results indicated that less than one percent of the total cropland in the Undulating Plains was planted to irrigated cotton, returns were lower for this crop than any other. While crops suitabilities are adequate for irrigated cotton, expansion of hectarages would be subject to governmental decisions.

Vegetables, such as cucumbers, irrigated potatoes, and watermelons, offered the next highest level of returns, although in the survey only 3 percent of the total hectarage of crops planted were vegetables. Crop suitability ratings are sufficiently high, and increases in area planted to these crops could be expected. However, rainfed production would need to be in the higher rainfall areas of the region.

Tree crops compose only about 5 percent of the region's total hectares planted to crops. Despite relatively high returns from olives, there is little reason to expect increases in hectares planted.

In RPU20, cotton was the most profitable crop encountered in the survey, while barley appeared more profitable than local wheat. Both local wheat and potatoes were profitable crops in RPU23 and would merit expansion. Only olives turned out to be profitable in RPU24, with negative net earnings occurring with cereal crops. Barley and lentils were profitable in RPU25, while local wheat net earnings were negative. Olives were profitable, while grapes and figs yielded negative returns. Positive returns were received in RPU27 only for barley. Dry onions showed promise in RPU38, as did cereal crops, lentils and watermelons, which yielded higher returns than all crops encountered except dry onions. Barley was a break-even crop in RPU48, while negative returns occurred with local wheat. Cotton was the highest net earning crop in RPU49 and, pending governmental decisions and water availability, would warrant expansion. Returns from local wheat and barley were among the highest in the region. Cotton returns were lower in RPU47 than for other crops, although on a per dunom basis, the returns were higher than for other crops. Mexican wheat had slightly higher returns than did local wheat production and barley. Crops also showed a potential for expansion, whereas in the other RPUs, where grapes were recorded, returns were negative.

Euphrates and Tributaries Region

Well over half the cropland planted in the Euphrates and Tributaries Region was planted to small grains, primarily irrigated, according to survey results. With returns levels that existed and the suitability of the land for production of these crops, especially for Mexican wheat, expansion in hectarages would be expected. Expansion, however, would be subject to limitations of government programs, adequacy of irrigation water, and gypsiferous soil conditions in some areas.

Irrigated cotton, according to survey results, was planted on about 38 percent of the total land planted to all crops in this region. Returns were highest for this crop but increases in hectarages are also limited by government control programs, availability of irrigation water, and gypsiferous soild conditions in some locations.

Tomatoes, occupying almost 3 percent of the planted cropland and sesame another 2 percent, both irrigated, ranked next in profitability. The same physical limitations occur with these crops as with cotton and small grains except for the absence of governmental controls. Therefore, expansion of hectarages planted to these crops could be expected.

Sugar beets, profitable in the region only if family labor costs are ignored, were planted on almost 4 percent of the total cropland planted. Other than government programs, the high labor costs would limit increases in planting of this crop.

Other than the controlled crops, tomatoes and sesame performed well in RPU32 and would merit consideration for expansion of dunoms planted to these crops. Cotton net earnings were higher in RPU32 than in other RPUs of the region and could be profitably expanded in land area if government decisions so indicate and irrigation water is available. Local wheat outperformed Mexican wheat slightly. Mexican wheat appeared much more profitable in RPU40 than local wheat, while cotton was the most profitable crop. In RPU42, cotton was profitable, while barley was a break-even crop.

Northeast Region

The Northeast had over 92 percent of its total land in crops planted to small grain. Returns per dunom for local and Mexican wheat, and barley ranked high, although further expansion to include additional hectarages would be limited by the nature of governmental programs affecting these crops generally, and low rainfall in the southern segment of the region.

Rainfed lentils planted on about two percent of the total cropped area in the region ranked below small grains in returns. Cotton, under irrigation, produced higher returns per dunom than any crop in the region. Increases in cropland planted to cotton would depend upon governmental regulations and the adequacy of irrigation water. According to survey results, cotton occupied 5 percent of the region's total land in crops.

Cotton production was the most profitable enterprise in RPUs41, 45, 46, 51, 52 and 53, the only RPUs in the region where this enterprise was recorded. Expansion of these crops would depend upon governmental decisions and the availability of irrigation water. Otherwise, local wheat was the most profitable crop in these and the remaining RPUs of the region, except for RPU52, where lentils earned higher returns, and RPU53, where barley earned higher returns. Local wheat was more profitable than Mexican wheat except in RPU56, where net earnings were the same.

Southwest Region

Over 62 percent of the land in crops in the Southwest was planted to small grains, and about 10 percent to lentils and chickpeas. Produced primarily under rainfed conditions, returns per dunom from these crops were negative and the last in rank of returns among the crops for which data were obtained. Little reason exists for expanding the hectarage planted to small grains in the region, unless family labor is reconciled to very low returns for its labor. In any case, low rainfall becomes a limiting factor in some areas, and crop production decisions by government officials must also be considered relative to expanding hectarages.

Tree and vine crops occupied over 20 percent of the total land in crops. Rainfed grapes and figs, irrigated apples and apricots, and olives were the crops for which data were obtained. Return levels, exceeded only by cotton and vegetables, and adequate crop suitability ratings indicate a potential for the allocation of additional land in the region to production of tree and vine crops.

Irrigated hectarages of cotton and vegetables, including tomatoes and potatoes, would be expected to increase within the restrictions of adequate irrigation water supplies. However, cotton comes under governmental production controls, which would affect any increases in planted areas.

Net earnings were negative in all RPUs of the Southwest for local wheat except for RPU3, where production occurred largely under irrigation. No Mexican wheat was recorded in any of the 9 RPUs of the Southwest during the survey. Net earnings were positive for barley only in RPUs10 and 15, which were partially irrigated. Lentils had negative net earnings in the three RPUs where production was recorded, all rainfed production, including RPUs2, 4 and 5. Chickpeas, all rainfed production, were relatively profitable in all the RPUs where produced, including RPUs4, 5, 9 and 15. Cotton was profitable under irrigation in the only RPU where production was recorded, RPU10.

Tomatoes were profitable under irrigation in RPU10, and especially so in RPUs3 and 15 of the Southwest. Potatoes, irrigated almost entirely, were profitable in RPU16, but a sizeable loss occurred in RPU9. While grapes were unprofitable in RPU11, net earnings were sizeable in RPUs9 and 15. All grape production on farms surveyed took place under rainfed conditions. Olives produced largely under irrigation in RPUs3 and 15 earned more than all crops except tomatoes for these RPUs. Olives, over half irrigated, earned the highest net earnings in RPU4. Figs, all produced under

rainfed conditions on farms surveyed yielded positive net earnings in RPUs4, 9 and 15. Apples were produced only in RPU15 of the Southwest, according to survey results, and returns were less than figs but more than apricots. Apricots were grown only in RPU9, where net earnings were negative, and in RPU15, where net earnings about equalled apples. All apricot production was irrigated. Bitter vetch and maize, the other crops grown in the Southwest, yielded negative net margins, except for maize in RPU3. Maize was irrigated, whereas bitter vetch was produced on dryland.

Steppe Region

Cropland of the Steppe Region is located in small segments bordering the Euphrates and Tributaries and Undulating Plains Regions in the northwest, and bordering the Undulating Plains to the southwest. Over 92 percent of the land in crops was planted to barley, according to survey results. Almost 2 percent was planted to local and Mexican wheat. Most all of these small grains were produced under rainfed conditions. Barley returns were negative, indicating little potential for crop hectarage expansion. Wheat returns appeared adequate, especially for Mecican wheat and, within the confines of limited rainfall and government crop restrictions, could result in some potential for expansion of hectarages planted.

Grapes, for the most part rainfed, offer some potential for expanding hectarage as a result of higher return levels. Rainfall would be limiting over most of the regions and increases much above the survey results of one percent of total land in crops appear doubtful.

Irrigated cotton and vegetable crops have considerable potential for production in most areas of the Steppe. Adequate water supplies are the limiting factor other than government programs for cotton. All together, these crops accounted for only about 3 percent of the total land in crops. Sugar beets had high costs of production and were less profitable in the region than most other crops.

Only RPU33 of the Steppe had no crop production, according to survey results. Local wheat production was profitable from a net earnings standpoint in RPUs19, 21 and 41, with all production except that in RPU21 being largely irrigated. Mexican wheat production turned out to be more profitable than other crops, except irrigated cotton, in RPU19, where the cereal crop was produced under rainfed conditions, and in RPU31. where production was irrigated. Barley production, according to survey results, was profitable in terms of net earnings only in RPU21, where production occurred under rainfed conditions. Barley production, rainfed, was a break-even enterprise in RPU31. Lentils, irrigated in RPU19, still earned negative net earnings, while rainfed lentil production in RPU13 was also a negative income crop. Cotton was profitable under irrigation in RPUs19, 31 and 41. Except for RPU41, irrigated cotton was the most profitable, whereas irrigated dry onions were more profitable in RPU41. Sugar beets. produced under irrigation, occurred only in RPU31, where the enterprise was a breadk-even situation. Irrigated tomato production resulted in negative net earnings both in RPUs19 and 41. Grapes, mostly rainfed, were the most profitable crop in RPU13, while negative net earnings resulted for this enterprise under

irrigation in RPU17. Apricots, irrigated, was the second most profitable crop in RPU13, and the only RPU in which this crop was recorded during the survey. Bitter vetch, rainfed, occurred only in RPU13 also and was the third most profitable enterprise. Maize occurred only in RPU19, where, under irrigation, returns were negative.

All Regions

Potentials for adjusting relative proportions of land in various crops consistent with returns reported in the survey, and within the confines of crop suitabilities. together with programs for the government controlled crops, include:

Increasing rainfed small grain hectarage in the Northeast and Undulating Plains, while holding hectarage at current levels in the Coastal, Mountain and Southwest Regions.

Increasing irrigated small grain hectarages in the Lowlands and the Euphrates and Tributaries Regions if irrigation water can be made available either through more efficient use and reduction of waste of existing supplies or through developing new sources.

Increasing lentil hetarages in the Undulating Plains and Northeast, and chickpea hectarages in the Lowlands and the Southwest Regions.

Increasing irrigated cotton hectarage in the Euphrates and Tributaries and Northeast Regions, and increasing hectarages in the Lowlands only as cost reducing production practices are applied.

Increasing irrigated sugar beet hectarages in the Lowlands and Euphrates and Tributaries Regions, providing additional cost reducing production practices are adopted.

Increasing hectarages of tobacco in the Mountain Region only as indicated by crop and soil suitabilities.

Maintaining the extent of irrigated peanut hectarages in the Coastal Region while developing further the potentials that exist in the Lowlands, including the adoption of cost reducing production practices.

Increasing the hectarage of irrigated dry onions in the Coastal and Lowlands Regions and, if irrigation water is sufficient, in the Steppe.

Increasing irrigated and rainfed cucumber hectarage in the Coastal Region.

Increasing rainfed and irrigated tomato hectarage in the Coastal Region, and irrigated hectarages in the Euphrates and Tributaries Region and , to the extent irrigation water is available, also in the Southwest.

Increasing irrigated potato hectarages to the extent irrigation water is available in the Undulating Plains and the Southwest. Maintaining current hectarages of irrigated potatoes in the Lowlands and not increasing hectarages until cost reducing production practices are applied.

Maintaining current hectarages of irrigated eggplants in the Coastal and Mountain Regions and not increasing hectarages until cost reducing practices are applied.

Increasing hectarages of rainfed watermelons in the Lowlands and Undulating Plains Regions.

Increasing hectarages of rainfed olives in the Mountain Region and irrigated and rainfed olives in the Lowlands and Southwest Regions.

Increasing hectarages planted to rainfed grapes in the Southwest, the higher rainfall areas of the Steppe, and the Mountain Region.

Increasing hectarages of rainfed figs in the Southwest and Mountain regions, and to some extent in the Coastal Region.

Increasing irrigated applies and apricot hectarage in the Southwest, and rainfed hectarages in the Mountain and, to the extent irrigation water is available, also in the Steppe.

Increasing rainfed lemon hectarage in the Coastal Region and irrigated lemon hectarages in the Lowlands.

Increasing irrigated sesame hectarages in the Euphrates and Tributaries Region and, to the extent soils and crop potentials are sutiable, increasing rainfed and irrigated hectarages of sesame in the Mountain Region.

Increasing hectarage of rainfed and irrigated forage crops in all regions where crop suitabilities and irrigation water supplies are sufficient. While little cost and returns information were collected on these crops, indications are that forage prices may be quite competitive with prices of other crops, reflecting the shortage of forage that exists for livestock production. Irrigated areas, such as the Lowlands and the Euphrates and Tributaries Regions would seem to be locations for planting forage crops, such as alfalfa and other legumes and forage sorghums. Rainfed production of legume forage would have potentials in the higher rainfall areas of the Northeast, Undulating Plains and Southwest, where these forage crops could be incorporated into rotations with cereal crops in place of fallow. The extent to which forage crop production expansion is feasible would depend on the adoption of improved mechanized harvesting and transportation methods.

E. Crop Yields and Production Practices

An important part of the farm survey was the acquisition of production practices, inputs and yields data for the major crops grown in Syria. The method used in this analysis was first to separate at the RPU level the data obtained from each farm holder concerning each crop into irrigated and rainfed production. Crop yields for each crop were then arrayed from the highest to lowest, making a list for each RPU for irrigated and rainfed yields. These lists were then divided into approximately three equal-sized

groups based on the high, medium and low crop yield recorded. Data were recorded from survey results for each individual farm holder concerning cultivation size (parcel or field size for each crop), product yield, crop seeding rate, fertilizer and pesticide use, and crop rotation system. Averages for each RPU were then calculated. The resulting data by RPU and crop were then grouped into the type of farming regions and averages obtained by region.

The number of observations for each crop on which costs and returns information were obtained in the survey was sufficient to include only some of the major crops. Therefore, results are reported by region on only those crops with a sufficient number of observations for reliable comparison.

Within each region, variations in practices in the production of each crop were generally limited. Much of the variation in yields of any one crop in any region apparently reflects differences among farmers in their farming abilities or among fields in an area in productivity. In the summary that follows, only those variables that appeared to be of significance in affecting yields of one or more crops in several regions are identified and results reported. Other variables, such as amounts of hand labor and farm size, did not vary in any consistent fashion with yields.

Coastal Region

Inferences apparent for rainfed local wheat in the Coastal Region, consisting only of RPU28, are that highest yields were obtained by the group of holders who farmed the smallest fields of local wheat, seeded at considerably higher rates, and used slightly more nitrogen fertilizer (Table 13). The dominant rotation for the high yield group included peanuts, a nitrogen-fixing legume crop, which may have had a positive effect on yields. The lowest yield group farmed the largest fields, seeded at half the rate of the high yield group, used almost as much nitrogen, while one-third of the producers in this group used phosphorus and potassium.

For irrigated peanut production in the Coastal Region, the group of holders with high yields farmed the smallest peanut fields, seeded at higher rates than those with low yields, and used more nitrogen and potassium fertilizers than the others (Table 13). More phosphorus was also applied by the high yield group, for although the rates were the same as the other groups the proportion of holders applying phosphorus was higher. Although a slightly smaller proportion of producers in the high yield group used insecticides on peanuts, the expenditure for insecticides was much greater. The dominant crop rotation used by the high yield group included more frequent use of cereal crops along with peanuts, while the dominant rotation in the low yield group tended toward more vegetable crops or more frequent plantings of peanuts.

Mountain Region

Production practices explaining differences in rainfed local wheat yields in the Mountain Region are not clearly obvious (Table 14). Field

Table IV-13. Yield Classes and Associated Production Practices By Crop, Coastal Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun)	Fert. Use (kg/dun. and Pct. Rept) 2/			Pest (SL/dun. 2/ and Pct. Rept.		Dominant Rotations (Years Ago) 3/					
				N	P	K	Insect.	Herb.	1	2	3	1	2	3
Rainfed:														
Local Wheat														
High	20	200	25	3(100)					C	V	P			
Med.	30	150	15						V	C	V			
Low	78	100	11	2(100)	1(33)	1(33)			V	V	C			
Irrigated:														
Peanut														
High	4	162	8	8(100)	2(40)	3(40)	13(20)		C	P	C	M	V	P
Mid.	10	128	8	6(100)	2(33)	1(33)	4(33)		C	V	P	V	C	V
Low	9	105	5	6(100)	2(33)	1(33)	1(33)		C	V	V	C	P	P

1/ Grouped according to one-third of the observations in each yield class (high, medium, low).
2/ Percent of all farms reporting use in parentheses.
3/ Years preceeding current crop. Dominant rotation in first colums; subdominant rotations in second columns. (C = Cereals, L = Legumes, T = Tubers, SB = Sugar Beet, CT = Cotton, M = Melons, Cucumbers, V = Vegetables, TB = Tobacco, O = Other, F = Fallow, P - Peanuts

Table IV-14. Yield Classes and Associated Production Practices By Crop, Mountain Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun)	Fert. Use (kg/dun. and Pct. Rept) 2/ N	P	K	Pest (SL/dun. 2/ and Pct. Rept. Insect.	Herb.	Dominant Rotations (Years Ago) 3/ 1	2	3	1	2	3
Rainfed:														
Local Wheat														
High	14	122	17	4(87)				3(20)	TB	C	TB			
Med.	12	84	15	6(79)	2(6)	2(3)		2(6)	TB	C	TB			
Low	16	60	14	4(88)	2(2)	7(4)		1(2)	TB	C	TB			
Barley														
High	8	93	16	6(60)	2(20)	4(60)			CT	C	F	TB	C	TB
Med.	19	69	12	3(100)					L	M	C	F	C	F
Low	19	39	10	3(75)					F	C	F	C	L	C
Lentils														
High	8	73	13	3(11)	4(22)		4(11)		C	F	L	C	V	C
Med.	11	51	23	2(22)			2(44)		C	L	F	F	C	F
Low	6	37	12	4(17)	1(17)		4(34)		C	F	L	C	L	C
Tobacco														
High	4	94	--	15(87)			9(87)		C	TB	C			
Med.	5	53		6(80)			4(80)	2(80)	C	TB	C			
Low	7	34		10(76)			7(76)		C	TB	C			

1/ Grouped according to one-third of the observations in each yield class (high, medium, low).
2/ Percent of all farms reporting use in parentheses.
3/ Years preceeding current crop. Dominant rotation in first columns; subdominant rotations in second columns. (C = Cereals, L = Legumes, T = Tubers, SB = Sugar Beet, CT = Cotton, M = Melons, Cucumbers, V = Vegetables, TB = Tobacco, O = Other, F = Fallow).

sizes among the three yield groups were similar, the high yield group used the same amount of nitrogen fertilizer as the low yield group. while the low and medium yield groups also used phosphorus and potassium fertilizers, although a smaller percentage of the producers reported their use. The cereal-tobacco rotations were the same among the yield groups. Nevertheless, the high yield group seeded at higher rates and made larger expenditures on herbicides, with a larger proportion applying herbicides, than the other yield groups. Total hours of animal and tractor power used per dunom was slightly higher for the high yield group, while total hand labor hours were somewhat lower. Approximately 3 times as much animal power was used as machine hours in this region on rainfed local wheat production regardless of yield level. All RPUs of the region were represented by rainfed production of local wheat.

The high yield group producing rainfed barley cultivated smaller barley fields and seeded at considerably heavier rates (Table 14). Although a smaller proportion of the operators used nitrogen fertilizer, the rate of application was higher than for the other two yield groups. Phosphorus and potassium fertilizers were also used by the high yield group. although not all producers in the group made applications. At the same time, the medium and low yield groups used crop rotations that included legumes and fallow, while the rotations of the high yield group generally included cotton and tobacco. Use of animal power in producing rainfed barley was about twice the hours of machine use, with total hours of use per dunom for each being higher among the higher yield groups. Hand labor hours were also greater per denom for the higher yield groups. All of the RPUs in the Mountain Region were represented by rainfed barley production.

None of the factors recorded appear to explain yield differences among the yield groups producing rainfed lentils (Table 14). A higher application rate of phosphorus fertilizer. with a higher proportion of producers reporting their use, however, occurred with the high yield group. At the same time, a smaller proportion of this group used insecticides. Crop rotations among the yield groups were similar. While animal power hours per dunom exceeded machine power hours per dunom for all yield classes, the total use of power was less for the higher yield groups, as was hand labor use in hours per dunom. RPUs29 and 36 had more observations than did the other RPUs in the Mountain Region for this analysis.

Among the three yield groups producing rainfed tobacco, the high yield group farmed smaller fields and used more nitrogen fertilizer, with larger proportions of the producers reporting use (Table 14). The same held for insecticide use among the high yield group. Crop rotations were the same among the three yield groups. Machine hours per dunom were higher for the high yield group than for other yield groups. while animal power hours per dunom were less. Nevertheless, animal power use per dunom far exceeded machine use. Total hours of hand labor used per dunom with tobacco appeared to be directly related to yields, with the high yield group having the highest hand labor use. RPUs30, 36 and 58 had producers who were represented in this analysis.

Lowlands Region

No outstanding differences in production practices recorded appear to explain differences in rainfed local wheat yields (Table 15). The medium and low yield groups seeded at heavier rates, used more fertilizer, and a larger proportion used pesticides than the high yield group. No real differences appeared in the crop rotations. The high yield group, however, used less animal power per dunom than did other yield groups, and more machine power. At the same time, hand labor use was considerably less for the high yield group than for the other 2 yield groups. Of the 4 RPUs in the Lowlands Region, RPUs26 and 34 were the main ones represented in this analysis.

Similarly, producers of rainfed Mexican wheat exhibited little difference in farming practices among the yield groups (Table 15). A lower seeding rate could help explain the yields of the low yield group, while the inclusion of melons in the rotation may have had a negative effect on wheat yields. The high yield group used less fertilizer, no pesticides, and included cotton in the rotation, all of which would be expected to lower wheat yields. None of the producers of Mexican wheat used animal power, while the use of machinery power in hours per dunom was highest for the high yield group. Hand labor use was also lowest for the high yield group. RPUs26 and 34 were the RPUs contained in most of this analysis.

No apparent reason can be given for differences in rainfed barley yields in the Lowlands Region (Table 15). The low yield group used about the same amount of nitrogen fertilizer per producer reporting, although most did not use fertilizer. Fallow was included in the rotation of the high yield group which may have had a positive influence on yields. Animal power was used only by the low yield group, and machinery power use was much less per dunom than for the other two yield groups. Still, machine hours per dunom were about the same for the high and medium yield group, while total hand labor hours were less for the high yield group. RPUs26, 34 and 35 were the primary ones associated with this analysis.

Compared with the other two yield groups, the high yield group producing rainfed lentils in the Lowlands cultivated smaller fields, seeded at heavier rates, and used more potassium fertilizer (Table 15). A larger proportion of the producers in the high yield group used phosphorus fertilizer and pesticides. The crop rotations among crop yield groups were similar, although the inclusion of melons in the rotation by the lower yield group may have lowered their yields. All three groups used both animal and machine power in lentil production, while animal power use was considerably less per dunom among high yield producers. Hand labor use per dunom, at the same time, was higher for the high yield group. Only RPU26 was represented in this analysis.

In explaining differences among yield groups, producing irrigated local wheat it appeared that cotton and sugar beets in the rotations for the medium and low yield groups may have lowered the irrigated wheat yields that followed (Table 15). Fertilizer use, except for potassium, was heavier for the medium and low yield groups than for the high yield group, as was the case

Table IV-15. Yield Classes and Associated Production Practices By Crop, Lowlands Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun)	Fert. Use (kg/dun. and Pct. Rept) 2/			Pest (SL/dun. 2/ and Pct. Rept.		Dominant Rotations (Years Ago) 3/					
				N	P	K	Insect.	Herb.	1	2	3	1	2	3
Rainfed:														
Local Wheat														
High	32	192	15	5(71)	2(50)	1(28)	8(10)	1(14)	M	C	C	M	L	C
Med.	24	103	16	19(58)	2(50)	1(17)	2(17)	2(50)	M	L	C	M	L	M
Low	40	57	22	5(70)	2(30)	1(10)	6(50)	2(30)	M	C	M	M	L	C
Mex. Wheat														
High	16	147	11	2(67)	0	0	0	0	CT	C	CT			
Med.	140	128	13	6(67)	2(67)	2(33)	0	1(67)	CT	C	CT	L	C	CT
Low	16	96	9	5(100)	1(25)	8(25)	1(25)	0	M	C	M	CT	C	CT
Barley														
High	19	134	12	4(73)	2(64)	1(9)	0	0	F	C	C	F	M	C
Med.	28	98	22	4(78)	2(33)	0	0	2(11)	M	C	M	M	C	C
Low	21	66	15	5(44)	2(22)	4(33)	0	0	L	C	C	M	C	M
Lentils														
High	12	113	15	4(44)	2(44)	13(22)	5(33)	5(11)	C	L	C	C	M	L
Med.	22	67	11	3(60)	2(20)	1(30)	5(10)	0	C	C	L	C	C	F
Low	36	40	11	4(25)	3(38)	1(25)	3(25)	0	C	M	L			

(Continued)

Table IV-15.(Continued) Yield Classes and Associated Production Practices By Crop, Lowlands Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun)	Fert. Use (kg/dun. and Pct. Rept) 2/			Pest (SL/dun. 2/ and Pct. Rept.		Dominant Rotations (Years Ago) 3/					
				N	P	K	Insect.	Herb.	1	2	3	1	2	3
Irrigated:														
Local Wheat														
High	11	344	16	5(100)	0	6(17)	0	1(17)	M	C	M	M	L	C
Med.	23	214	16	11(100)	2(20)	1(20)	0	1(40)	CT	SB	CT	CT	C	SB
Low	10	204	16	7(80)	2(20)	0	5(20)	0	CT	C	SB	CT	C	CT
Mex. Wheat														
High	8	181	21	5(100)	2(25)	3(38)	0	2(38)	CT	C	CT	C	C	C
Med.	8	117	19	6(100)	1(11)	1(11)	1(33)	4(67)	SB	C	SB	CT	C	CT
Low	7	54	17	14(88)	1(38)	0	2(12)	2(38)	CT	C	CT	C	C	C
Cotton														
High	16	271	12	10(83)	4(75)	9(67)	4(58)	C	SB	CT	C	C	CT	C
Med.	13	183	13	9(67)	3(11)	12(11)	8(33)	6(44)	CT	CT	CT	C	CT	C
Low	17	94	10	9(78)	3(67)	4(56)	6(33)	0	C	CT	C	C	CT	SB
Sugar Beets														
High	6	3791	2	7(100)	5(57)	14(100)	8(71)	0	SB	C	SB	T	SB	T
Med.	11	2661	4	12(88)	5(62)	15(75)	4(100)	4(12)	CT	CT	SB	C	SB	CT
Low	11	1302	2	5(71)	3(71)	3(71)	7(86)	2(14)	SB	SB	SB	C	SB	C

1/ Grouped according to one-third of the observations in each yield class (high, medium, low).
2/ Percent of all farms reporting use in parentheses.
3/ Years preceeding current crop. Dominant rotation in first columns; subdominant rotations in second columns. (C = Cereals, L = Legumes, T= Tubers, SB = Sugar Beet, CT = Cotton, M = Melons, Cucumbers, V = Vegetables, TB = Tobacco, O = Other, F = Fallow).

with pesticide use. Both animal and machine power were used by all three yield groups, although machine power hours per dunom were higher for the high yield group and animal power use lower. Hand labor use per dunom was higher for the high yield group than the medium yield group. while hand labor use was lowest for the low yield group. RPUs26. 34 and 35 were included in this analysis.

Among yield groups producing irrigated Mexican wheat in the Lowlands seeding rates were heavier for the high yield group (Table 15). The use of phosphorus and potassium fertilizer was heavier also for the high yield group . No apparent differences in yields can be attributed to differences in crop rotations. Animal power was used only by the medium yield group, while machinery power per dunom was less for the high and medium yield groups than the lower yield group. However, hand labor use per dunom was somewhat lower for the high yield group than the others. Only in RPU34 was the number of observations sufficient for this analysis.

For irrigated sugar beet production factors influencing yields appeared to be smaller fields for the high yield group and continuous cropping with sugar beets for the low yield group (Table 15). Although nitrogen and potassium fertilizer use was not heavier for the high yield group. larger proportions of producers in this group applied this group applies these fertilizers than those in the other two groups. Slightly higher expenditures were made for insecticides among the high yield group, although a smaller proportion of producers in this group applied insecticides. Both animal and machine power were used by producers in all three yield groups. High and medium yield groups used slightly more total power per dunom than the low yield group, while machine power was equally divided between animal and machine time in the high yield group. Producers in RPU34 were the main constituents of this analysis.

In the case of irrigated cotton in the Lowlands, seeding rates were heavier for the high and medium yield groups and the use of nitrogen and phosphorus fertilizers was heavier with a larger proportion of producers reporting use. Although the application rate was lower, the proportion of producers applying insecticides was larger for the high yield group. No apparent differences in crop rotations that would likely influence yield differences seemed to exist. Use of animal power per dunom was greater for the high yield group than for other yield groups, as was the use of hand labor. Machine power hours per dunom was greater for the low yield group and about equal for the high and medium yield groups. Cotton production in this region occurred in RPUs26 and 34.

<u>Undulating Plains</u>

Observed production practices related to yields of rainfed local wheat indicated that the high yield group seeded at heavier rates and applied more nitrogen and potassium fertilizer (Table 16). The high and medium yield groups farmed smaller fields than did the low yield group. No differences in crop rotations are apparent, except the presence of two years of fallow in the secondary rotation of the low yield group may indicate less suitable

Table IV-16. Yield Classes and Associated Production Practices By Crop, Undulating Plains Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun)	Fert. Use (kg/dun. and Pct. Rept) 2/			Pest (SL/dun. 2/ and Pct. Rept.		Dominant Rotations (Years Ago) 3/					
				N	P	K	Insect.	Herb.	1	2	3	1	2	3
Rainfed:														
Local Wheat														
High	16	99	16	4(30)	3(7)	4(12)		3(2)	F	C	F	F	C	C
Med.	15	53	14	2(33)	7(2)	3(2)	2(2)	2(2)	F	C	F	F	C	C
Low	55	37	12	2(22)	3(2)			2(6)	F	C	F	F	F	C
Mex. Wheat														
High	20	144	13	7(50)	5(50)				F	C	F			
Med.	32	122	10	1(50)	3(50)				F	C	F			
Low	30	43	10						F	C	F			
Barley														
High	68	111	14	4(19)	1(4)	4(7)	3(1)	1(4)	F	C	F			
Med.	46	72	11	4(21)	6(3)			3(2)	F	C	F			
Low	57	35	12		6(19)	6(2)	3(2)		F	C	F	C	F	F
Lentils														
High	26	119	16				1(25)		C	M	L	F	C	F
Med.	11	92	13	1(40)	1(40)				C	F	C	C	M	C
Low	18	51	16	4(17)	1(17)		2(33)		C	F	C			

(Continued)

Table IV-16. (Continued) Yield Classes and Associated Production Practices By Crop, Undulating Plains Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun)	Fert. Use (kg/dun. and Pct. Rept) 2/			Pest (SL/dun. 2/ and Pct. Rept.		Dominant Rotations (Years Ago) 3/					
				N	P	K	Insect.	Herb.	1	2	3	1	2	3
Irrigated:														
Local Wheat														
High	23	260	14	8(100)	4(33)	2(67)			CT	C	CT	C	C	V
Med.	24	145	16	7(100)	6(40)	2(20)		1(20)	CT	C	CT	L	F	C
Low	15	86	12	8(25)					C	C	C	F	C	F
Barley														
High	91	412	13	3(67)	5(33)				C	V	C	C	C	C
Med.	25	131	14	11(67)	4(33)	7(33)		2(33)	F	C	L	F	CT	L
Low	10	103	10	6(67)					V	C	V	V	F	C
Cotton														
High	115	300	14	13(50)		25(100)	3(50)		C	CT	C			
Med.	16	250	9	11(100)	5(83)	10(83)	2(33)	9(33)	C	CT	C	C	F	CT
Low	6	111	23	12(67)	2(67)	1(67)			C	CT	C	C	CT	M

1/ Grouped according to one-third of the observations in each yield class (high, medium, low).
2/ Percent of all farms reporting use in parentheses.
3/ Years preceeding current crop. Dominant rotation in first columns; subdominant rotations in second columns. (C = Cereals, L = Legumes, T = Tubers, SB = Sugar Beet, CT = Cotton, M = Melons, Cucumbers, V = Vegetables, TB = Tobacco, O = Other, F = Fallow).

soil and climatic conditions for rainfed wheat production. Both animal and machine power were used by producers in the three yield groups. Use of animal power per dunom was lowest in the high and low yield groups, while machine hours per dunom were highest in the high yield group. Hand labor use per dunom was only slightly lower in the lower yield group than in the other two yield groups. All RPUs in the Undulating Plains except RPU23 were represented in this analysis.

Yields of the high yield group producing rainfed Mexican wheat in the Undulating Plains appeared to be related to smaller field size, higher seeding rate, and heavier use of nitrogen and phosphorus fertilizers (Table 16). Only the high yield group used animal power, while all three groups used machine power. Total power use in hours per dunom were greater for the high yield group, as was the use of hand labor. Records from producers in RPUs2, 38 and 57 were used in this analysis.

Not many reasons were apparent from the data recorded to explain differences in yields among the groups producing rainfed barley (Table 16). However, the seeding rate was heavier for the high yield group. although fertilizer use was generally less. The occurence of two years of fallow as a secondary rotation for the low yield group may indicate less suitable soil and climatic conditions for rainfed barley production. Both animal and machine power were used to produce rainfed barley. All three groups used more animal power per dunom than machine power. Total power hours per dunom were lowest for the medium yield group and highest for the low yield group, while total hand labor hours were highest per dunom for the high yield group. Producers in all RPUs in the region were used in the analysis.

The expected farm practices relating to yield differences appeared scanty in the case of rainfed lentil production in the Undulating Plains (Table 16). Although the high yield group seeded at a heavier rate than the low yield group, no holders in the higher yield group applied fertilizer. While the presence of a legume in the rotation of the higher yield group may have had a beneficial effect on yield, the occurrence of two year of fallow may also indicate less favorable climatic and soil conditions. Use of machine power was highest per dunom in the high yield group, while use of animal power was lower per dunom in this group than for the medium yield group. Labor use per dunom was highest in the high yield group. RPUs25, 37 and 38 were included in this analysis.

Irrigated local wheat yields of the high and medium yield groups appeared responsive to the higher seeding rates and fertilizer uses, compared with the low yield group (Table 16). The presence of two years of fallow as a secondary rotation for the lower yield group leads to speculation about the sufficiency of irrigation water for production. Both animal and machine power per dunom were greater in use for the medium yield group, as was total hand labor use. RPUs20, 24 and 49 were included in this analysis.

Among yield groups producing irrigated barley, the medium group used more nitrogen and potassium fertilizers than other yield groups (Table 16). Fallow appeared in the rotation of both the medium and low yield groups,

raising questions about the adequacy of irrigation water supplies for these yield groups. Hand labor use in hours per dunom was higher for the high yield group and machine hours per dunom were lower. Records from holders in RPUs20 and 57 were used in this analysis.

In irrigated cotton production, the high yield group had larger fields than did the other yield groups (Table 16). Nitrogen fertilizer use per farm holder applying fertilizer in this group was higher. The proportion of holders applying potassium fertilizer was also greater for the high yield group. No apparent differences in yields appeared to exist that are related to differences in crop rotations. Producer records in RPUs20, 24 and 57 were used in this analysis.

Euphrates and Tributaries Region

Among yield groups, production practices influencing differences in yields of rainfed local wheat include higher seeding rates and the application of phosphorus fertilizer by a small proportion of producers in the high yield group (Table 17). A larger field size was associated with the high yield group. The low yield group practiced a continuous cereal cropping sequence. No apparent differences in machine and animal power use were discernable, although machine power use was dominant. Records from producers in RPUs32 and 40 were used in the analysis.

Higher rainfed barley production yields in this region were related to larger field sizes and higher seeding rates (Table 17). In addition, the high yield group practiced a cereal-fallow rotation. while the two other yield groups farmed continuous cereals predominantly. Producer records from all RPUs in the Euphrates and Tributaries Region were used in the analysis.

Irrigated local wheat production in the region was influenced by heavier nitrogen and phosphorus applications among the high yield groups and heavier seeding rates among the high and medium yield groups (Table 17). Rotations practiced by the yield groups were essentially the same. Machine power use was prevalent among all yield groups. Only production in RPUs32 and 40 were used in this analysis.

Irrigated barley production yield differences among yield groups suggested that the high yield group had smaller fields, seeded at heavier rates, and half of the producers applied nitrogen fertilizer (Table 17). The high yield group followed a two-year cereal and cotton rotation, while the lower yield group followed a cotton-cereal-cotton-cereal rotation. Machine use in production was high for all yield groups. Records from producers in all RPUs of the region were included in this analysis.

Smaller fields and heavier rates of nitrogen fertilizer application, although only half of the producers applied nitrogen, seemed to be related to the yield response of the high yield group growing Mexican wheat (Table 17). Only RPUs32 and 40 were included in the analysis. Machine power prevailed over animal power use and no differences in total power use appeared related to yield differences.

Table IV-17. Yield Classes and Associated Production Practices By Crop, Euphrates and Tributaries Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun)	Fert. Use (kg/dun. and Pct. Rept) 2/			Pest (SL/dun. 2/ and Pct. Rept.		Dominant Rotations (Years Ago) 3/					
				N	P	K	Insect.	Herb.	1	2	3	1	2	3
Rainfed:														
Local Wheat														
High	106	67	10		5(12)				F	C	F	C	C	C
Med.	38	40	10						F	C	F	C	C	C
Low	52	21	7						C	C	C	C	F	C
Barley														
High	192	90	11						F	C	F	C	C	C
Med.	39	48	10						C	C	C	F	C	F
Low	49	26	9						C	C	C	C	F	C
Irrigated:														
Local Wheat														
High	10	355	16	8(78)	8(44)				CT	C	CT			
Med.	11	218	18	6(100)	5(73)	2(45)			CT	C	CT			
Low	13	117	11	6(100)	5(44)				CT	C	CT	C	CT	CT
Mexican Wheat														
High	8	305	8	13(50)	3(50)				CT	C	CT			
Med.	30	274	12	6(100)					CT	C	CT	CT	CT	C
Low	14	205	15	8(100)	6(67)				CT	C	CT			

(Continued)

Table IV-17. (Continued) Yield Classes and Associated Production Practices By Crop, Euphrates Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun)	Fert. Use (kg/dun. and Pct. Rept) 2/			Pest (SL/dun. 2/ and Pct. Rept.		Dominant Rotations (Years Ago) 3/					
				N	P	K	Insect.	Herb.	1	2	3	1	2	3
Irrigated:														
Barley														
High	4	320	20	10(50)					C	C	CT			
Med.	12	150	16						CT	C	CT	CT	C	C
Low	16	42	16						CT	C	CT	CT	C	C
Cotton														
High	40	377	13	9(91)	13(87)	2(9)	5(13)	10(44)	CT	CT	CT	CT	C	CT
Med.	33	302	11	8(95)	8(77)	2(4)	8(8)	10(36)	C	CT	C	C	C	CT
Low	31	178	12	6(92)	7(85)	2(29)		6(14)	C	CT	C			

1/ Grouped according to one-third of the observations in each yield class (high, medium, low).
2/ Percent of all farms reporting use in parentheses.
3/ Years preceeding current crop. Dominant rotation in first columns; subdominant rotations in second columns. (C = Cereals, L = Legumes, T = Tubers, SB = Sugar Beet, CT = Cotton, M = Melons, Cucumbers, V = Vegetables, TB = Tobacco, O = Other, F = Fallow).

The high yield group of irrigated cotton producers seeded at heavier rates and applied higher rates of nitrogen and phosphorus fertilizers (Table 17). A larger proportion of producers in the high yield group used insecticides and herbicides. The high yield group produced cotton following cotton in the rotation, while the other yield groups had a dominant system of cereals-cotton-cereals-cotton. Machine power use was prevalent in all yield groups and bore no particular relationship to yield differences. All RPUs of the region were represented in this analysis.

Northeast Region

Little evidence was exhibited that production practices differences analyzed had much effect on yield levels for rainfed local wheat production in the Northeast (Table 18). Seeding rates were only slightly heavier for the high and medium yield groups. Machine power was predominant in all yield groups, the lowest use per dunom being among the high yield group where total labor use also was the lowest per dunom. Producers in all RPUs of the region except RPUs38 and 54 were represented in this analysis.

No production practices appeared to be related to yield differences for rainfed Mexican wheat production (Table 18). However, the low yield group followed a three-year cereal-one-year fallow rotation pattern, while the other yield groups followed a fallow-cereal-fallow-cereal pattern. No animal power was used in rainfed Mexican wheat production, while machine power use was greater per dunom for the high and medium yield groups. Producers in RPUs45, 52, 53, 54 and 55 were included in this analysis.

Only slightly heavier seeding rates for the high yield group and smaller field sizes for the high and medium yield groups appeared to have any bearing on yield differences for rainfed barley production in the Northeast (Table 18). For the most part, machine power was used in production as opposed to animal power. Machine power hours used per dunom were higher for the high yield group than for the other two groups, while hand labor hours per dunom were lower. All RPUs except RPUs38, 51, 54 and 56 were considered in this analysis.

Irrigated local wheat production yields appeared to be somewhat higher for the groups who had larger proportions of producers applying fertilizer (Table 18). Otherwise, production practices were much the same among yield groups. Machine power was used predominantly, the highest use per dunom being among producers in the high yield group. Hand labor use per dunom was also lowest among producers in the high yield group. Producer records in RPUs41, 46, 51 and 52 were used in this analysis.

In the case of irrigated Mexican wheat production, a larger proportion of the producers in the high yield group applied phosphorus fertilizer than did other yield groups (Table 18). Both nitrogen and phosphorus uses were much heavier, however, for the medium yield group. Both animal and machine power were used by the high and medium yield group, while the low yield group used only machine power. Hand labor use per dunom was greater for the high yield group than the other groups. Records from producers in RPUs45, 52, 53 and 56 were obtained during the farm survey for this analysis.

Table IV-18. Yield Classes and Associated Production Practices By Crop, Northeast Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun)	Fert. Use (kg/dun. and Pct. Rept) 2/			Pest (SL/dun. 2/ and Pct. Rept.		Dominant Rotations (Years Ago) 3/					
				N	P	K	Insect.	Herb.	1	2	3	1	2	3
Rainfed:														
Local Wheat														
High	75	108	12	3(9)	2(9)				F	C	F			
Med.	92	86	12	1(10)	2(10)				F	C	F			
Low	62	62	10	6(2)					F	C	F			
Mex. Wheat														
High	96	130	12						F	C	F			
Med.	90	94	12						F	C	F			
Low	48	48	11						C	C	F			
Barley														
High	52	109	11						F	C	F			
Med.	52	73	10						F	C	F	C	C	F
Low	93	41	10						F	C	F	C	C	F

(Continued)

Table IV-18. (Continued) Yield Classes and Associated Production Practices By Crop, Northeast Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun)	Fert. Use (kg/dun. and Pct. Rept) 2/			Pest (SL/dun. 2/ and Pct. Rept.		Dominant Rotations (Years Ago) 3/					
				N	P	K	Insect.	Herb.	1	2	3	1	2	3
Irrigated:														
Local Wheat														
High	30	226	13	7(54)	6(54)				CT	C	CT			
Med.	37	166	13	6(90)	6(70)				CT	C	CT			
Low	54	106	12	4(40)	3(20)				CT	C	CT			
Mex. Wheat														
High	54	249	13	4(33)	6(50)				CT	C	CT			
Med.	62	218	13	13(100)	12(40)	20(20)			CT	C	CT			
Low	87	116	11	8(60)	6(40)				CT	C	CT			
Cotton														
High	30	339	13	6(93)	10(71)	3(21)	11(7)	10(14)	C	CT	C			
Med.	44	255	12	11(94)	13(19)	2(7)	14(12)	10(12)	C	CT	C			
Low	32	185	12	6(86)	7(86)			7(64)	C	CT	C			

1/ Grouped according to one-third of the observations in each yield class (high, Medium, Low).
2/ Percent of all farms reporting use in parentheses.
3/ Years preceeding current crop. Dominant rotation in first columns; subdominant rotations in second columns. (C = Cereals, L= Legumes, T= Tubers, SB = Sugar Beet, CT = Cotton, M = Melons, Cucumbers, V = Vegetables, TB = Tobacco, O = Other, F = Fallow).

High and medium yield groups producing irrigated cotton in the Northeast used more fertilizer than did the low yield group (Table 18). Otherwise, no real differences in production practices as related to yield differences appear to exist. Use of animal power per dunom was less and machine power per dunom greater for the high yield group than the other yield groups. At the same time, the hours of hand labor use per dunom was greater for the high yield group. RPUs41, 45, 46, 51, 52 and 53 entered into this analysis.

Southwest Region

Among yield groups producing rainfed local wheat in the Southwest, the high yield group farmed smaller fields and seeded at heavier rates than did other groups (Table 19). A small proportion of the high yield group applied insecticides, while none in the other groups did. The dominant rotation system for the high yielding group more generally included legumes and fallow, which may have accounted for the higher yields. Both machine and animal power use per dunom were higher for the high yield group than the other yield groups, as was the case also with hand labor use. Producer records in all RPUs of the region entered into this analysis.

A heavier seeding rate appeared to be the only production practice associated with higher rainfed barley yields (Table 19). Both animal and machine power were used in production. No definite pattern appeared which would associate power uses to yields. Records from producers in all RPUs except 3, 10 and 16 were used in this analysis.

Only a heavier seeding rate appeared to be related to higher rainfed lentil yields (Table 19). Both dominant and secondary crop rotations for the medium and low yield groups included legumes, while the high yield group included legumes only as a secondary rotation. Hand labor use was higher per dunom for the high yield group, as was the use of machine power. No animal power was used by this group, while the other yield groups used both animal and machine power. Data from interviews with producers in RPUs2, 4 and 5 of the Southwest were used in this portion of the study.

Rainfed chickpea production exhibited little relationship between production practices and yields (Table 19). However, the high yield group seeded at heavier rates, while the medium and low yield groups had sizeable proportions of producers applying insecticides. No apparent relationship appeared between power use and yields. Records from producers in RPUs4, 5 and 15 constituted the basis for this analysis.

For irrigated local wheat, seeding rates were heavier and the proportions of producers using nitrogen and phosphorus fertilizers were higher for the high yield group than the others (Table 19). The appearance of fallow in the dominant rotations for all three yield groups may indicate water supply problems for irrigated wheat production. However, a secondary rotation of cotton-cereals-cotton-cereals may indicate a more sufficient water supply for the high yield group. No apparent difference in power use per dunom appeared to be related to yield differences. Producer records in RPUs3, 9, 10 and 15 were used in these determinations.

Table IV-19. Yield Classes and Associated Production Practices By Crop, Southwest Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun)	Fert. Use (kg/dun. and Pct. Rept) 2/			Pest (SL/dun. 2/ and Pct. Rept.		Dominant Rotations (Years Ago) 3/					
				N	P	K	Insect.	Herb.	1	2	3	1	2	3
Rainfed:														
Local Wheat														
High	21	104	12				1(11)		F	L	F	F	C	F
Med.	32	58	10						F	C	F	F	L	C
Low	42	32	8	1(17)					F	C	F	F	F	C
Barley														
High	16	90	8						F	C	F			
Med.	14	52	7						F	C	F			
Low	25	28	6						F	C	F			
Lentils														
High	12	38	9						F	C	F	F	C	L
Med.	14	26	7						C	L	C	C	F	C
Low	10	25	6						C	F	L	F	C	L
Chickpeas														
High	41	105	9						F	C	L	C	L	C
Med.	34	61	7				2(33)		F	C	L	C	L	C
Low	21	28	7				2(30)		F	L	C	C	F	C

(Continued)

Table IV-19. (Continued) Yield Classes and Associated Production Practices By Crop, Southwest Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun)	Fert. Use (kg/dun. and Pct. Rept) 2/			Pest (SL/dun. 2/ and Pct. Rept.		Dominant Rotations (Years Ago) 3/					
				N	P	K	Insect.	Herb.	1	2	3	1	2	3
Irrigated:														
Local Wheat														
High	18	211	24	4(100)	6(75)	4(25)			F	C	F	CT	C	CT
Med.	11	147	21	8(25)	2(25)	1(25)			F	C	F			
Low	18	102	18	8(25)	8(25)	4(25)			F	C	F			

1/ Grouped according to one-third of the observations in each yield class (high, medium, low).
2/ Percent of all farms reporting use in parentheses.
3/ Years preceeding current crop. Dominant rotation in first columns; subdominant rotations in second columns. (C = Cereals, L = Legumes, T = Tubers, SB = Sugar Beet, CT = Cotton, M = Melons, Cucumbers, V = Vegetables, TB = Tobacco, O = Other, F = Fallow).

Steppe Region

Rainfed crop production was recorded in the Steppe. mainly in the northwest section bordering the Undulating Plains, while irrigated crop production occurred also in this area and near the Euphrates and Tributaries Region.

Rainfed local wheat yield differences appeared to be related to heavier seeding rates and fertilizer use among the high yield group (Table 20). However. only a relatively small proportion of producers interviewed in this group used fertilizer. Machine and animal power both were used in production, although machine power use predominated. Machine power hours per dunom were greater for the high yield group, as was the use of hand labor. Producers in all RPUs except 33 and 41 were included in this part of the study.

Only heavier crop seeding rates seemed to have any bearing on higher yields for rainfed barley production in the Steppe (Table 2). Machine power use was higher per dunom for the high yield group than the others, as was animal power use, while hand labor use per dunom was somewhat lower. Producers in all RPUs of the region except PRUs1, 21, 33 and 41 were included in this assessment.

In the case of irrigated local wheat production, field size was noticeably smaller, seeding rates heavier, and the proportions of producers reporting fertilizer uses were greater for the high yield groups than the other groups (Table 20). The nitrogen application rate also was slightly heavier for this high yield group. With the low yield group planting a straight cereal cropping system and a cereal-cereal-fallow rotation, some irrigation water supply shortage may have existed. Animal power use per dunom was greater for the high yield group and machinery power somewhat lower than for the other groups. Hand labor hours per dunom were higher for the medium yield group. with the high yield group being the next highest user of hand labor. Only producers in RPUs13, 17, 19 and 31 were included in this assessment.

Irrigated barley yields for the high yield group appeared to be related to smaller field sizes. heavier seeding rates, and a generally larger proportion of the producers in this group applying fertilizer (Table 20). However, irrigation water supplies may have been insufficient, as surmised from the appearance of fallow in crop rotations, particularly among the medium and low yield groups. Hand labor, animal power, and machiner power, in hours per dunom, were higher for the high yield group than for the other groups. RPUs13, 17 and 19 were included in this analysis.

For the most part. larger proportions of producers applying fertilizer helped explain the yields of the high irrigated cotton yield group (Table 20). Hardly any differencies appeared in crop seeding rates or rotations, although fallow occurred in secondary rotations of the medium and low yield groups. No differences in power use appeared that could be associated with yield differences. Producers only in RPUs19 and 31 were included in this analysis.

Table IV-20. Yield Classes and Associated Production Practices By Crop, Steppe Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun)	Fert. Use (kg/dun. and Pct. Rept) 2/			Pest (SL/dun. 2/ and Pct. Rept.		Dominant Rotations (Years Ago) 3/					
				N	P	K	Insect.	Herb.	1	2	3	1	2	3
Rainfed:														
Local Wheat														
High	20	89	11	4(15)	1(15)	1(3)			F	C	F	C	C	C
Med.	25	57	11	3(5)					F	C	F	C	C	C
Low	43	44	8	4(13)					F	C	F	C	C	C
Barley														
High	39	76	12						C	C	C	F	C	F
Med.	33	48	11						C	C	C	F	C	F
Low	61	26	8						C	C	C	F	C	F
Irrigated:														
Local Wheat														
High	8	302	19	8(88)	3(50)	2(25)			C	T	C	CT	C	CT
Med.	10	181	17	4(44)	4(22)	8(22)			C	C	C	CT	C	CT
Low	19	130	18	6(33)	7(33)	4(11)			C	C	C	C	C	F
Barley														
High	5	274	16	3(29)	3(29)	2(29)			C	C	C	C	C	F
Med.	14	140	14	13(14)					F	F	T	T	C	T
Low	44	50	11	2(29)	1(14)				C	C	F	F	F	C

(Continued)

Table IV-20. (Continued) Yield Classes and Associated Production Practices By Crop, Steppe Type of Farming Region, Cropyear 1977-1978, S.A.R.

Crop and 1/ Yield Class	Cult. Size (dun.)	Product Yield (kg/dun.)	Seeding Rate (kg/dun)	Fert. Use (kg/dun. and Pct. Rept) 2/			Pest (SL/dun. 2/ and Pct. Rept.		Dominant Rotations (Years Ago) 3/					
				N	P	K	Insect.	Herb.	1	2	3	1	2	3
Cotton														
High	39	269	11	6(100)	3(100)	1(40)			CT	C	CT	C	C	C
Med.	14	216	10	9(67)	3(67)	1(33)			C	CT	C	C	F	C
Low	12	157	11	6(67)	6(67)	2(33)			C	CT	C	F	C	F

1/ Grouped according to one-third of the observations in each yield class (high, medium, low).
2/ Percent of all farms reporting use in parentheses.
3/ Years preceeding current crop. Dominant rotation in first colums; sub-dominant rotations in second columns. (C = Cerreals, L = Legumes, T = Tubers, SB = Sugar Beet, CT = Cotton, M = Melons Cucumbers, V = Vegetables, TB = Tobacco, O = Other, F = Fallow).

Appendix 1

Farm Survey Methods

A. Sample Selection

The sampling plan for the farm survey called for selection of two villages within each Resource Planning Unit. The villages were arbitrarily chosen to provide as broad a representation of the agriculture within each RPU as possible. Of the 53 delineated RPUs, data for sampling were obtained from 52. A total of 101 villages were included in the sample, ranging from one village per RPU to as many as five villages.

A survey of the 101 villages was made to obtain a list of all holders in each village, together with information on the size of their holdings. Information also was obtained on organization of the villages and services available in each.

Within each village, the intent was for the farm survey sample to include, on the basis of total dunoms held, eight small holders, four medium-sized holders, and three large holders. Size classifications used were as follows:

	Small-sized holders	Medium-sized holders	Large-sized holders
		Dunoms	
Irrigated	1-24	25-99	100 or more
Rainfed	1-99	100-399	400 or more

The holders were randomly selected within each size group. To assure representation of livestock only holders, in those villages where such holdings existed, two of these holders were placed in the sample. The two livestock only holders selected replaced two of the farm holders. These livestock only holders were classified by size as follows:

	Small-sized	Large-sized
	No. of head	
Cattle	1-4	5 or more
Sheep or goats	1-49	50 or more

While the overall proportion of landless livestock holders to all holders was less than 6 percent, many villages had none. Of the total of 10,421 holders, including livestock only holders, there were 6,371 small-sized holders, 3,010 medium-sized holders, and 429 large-sized holders.

B. Sample Expansion

Overall, about 15 percent of the holders on the village survey list were sampled. Sample expansions were based on the proportions of holders in each holder size group selected from the total number listed. While the resulting weighted figures from the survey represent the villages included in the sample, the degree to which sample expansions estimate total values of crop production for the RPU, for example, are less precise.

Expansions, viewed in terms of production of all crops, must be considered in light of the limited number of crops that were included in the survey, and that not all fields operated by a sample holder may have been included. In the case of farms with many fields, coverage may have been limited to those fields that included about 80 percent of the value of crop production on the farm. (See following discussion).

C. Questionnaire Coverage

The FAO Farm Management Data Collection and Analysis System (FMDCAS) provided the format for collecting and analyzing comprehensive data on farm resources, inputs, production, costs, and returns. The program provided for the identification of each parcel of land, each field within the parcel, and the use of land in each field. This system is described in detail in FAO Agricultural Service Bulletin No. 34, copies of which were transferred to the State Planning Commission on completion of the project.

Preliminary field experience with the questionnaire in Syria indicated that as a result of the many fields found on some farms it was not practical to expect complete field coverage on every parcel of land for each holder sampled. The fatigue factor was too great on the part of both the holder and the interviewer. To limit interview burdens, enumerators were instructed to include fields that were most important, and which contributed about 80 percent of the holder's value of production. A further limitation was that enumerators were instructed to limit coverage to 28 specified crops.

Appendix 2

Farm Survey Analysis Formats

A. Computerized Farm and Enterprise Data Printouts

FAO's Farm Management Data Collection and Analysis System (FMDCAS), an electronic data processing system for the analysis. storage, and retrieval of systematically collected information regarding farming, was used to obtain several types of computer printouts for cost and returns analyses of farming in Syria.

Received at the Agricultural Sector Assessment Project offices in Damascus from FAO, Rome, were sets of three major computer printouts, each containing information relating to farming systems, quantities and values of inputs and output, and costs and returns statements:

(1) farm tables for each individual farm holder interviewed during the survey;

(2) crop tables concerning each of the 28 major crops, where applicable. by farm holder, including a crop table for each crop enterprise on each parcel and field for which data were collected;

(3) livestock tables, including data for each productive livestock enterprise, by farm holder, including a livestock table for each livestock enterprise;

(4) aggregated farm tables, where individual farm tables were summarized by farm size for each RPU;

(5) aggregate crop tables, where individual farm holder data for each crop enterprise were summarized by farm size for each RPU;

(6) aggregate livestock tables, where individual farm holder data for each livestock enterprise were summarized by farm size for each RPU.

On completion of the Agricultural Sector Assessment Project, all of the computer printouts listed above were transferred to the State Planning Commission.

B. Costs and Returns Formats

Primary emphasis in the farm survey analysis was given to the determination of costs and returns for the major crops grown in Syria. Use of computer aggregation routines resulted in crop enterprise budget printouts for small, medium and large-sized farm groups at the RPU level. Subsequently, these budgets were aggregated to type of farming region and national

levels for each major crop on the basis of proportions of total land devoted to each crop and the total production from each crop. Costs and returns per dunom for each crop at the RPU, regional, and national levels were weighted by the proportion of total dunoms reported for each crop in the survey. At the same time, costs and returns per 100 kg figures for each crop were weighted by the proportions of total production reported in the survey at the RPU, regional and national levels. Thus, the per dunom costs and returns figures recorded, if converted to a 100 kg of production basis, will not necessarily agree with the per 100 kg figures recorded, for the weights used in each case were usually different.

Costs and returns determined for each crop include:

(1) Total variable costs--cash costs or values placed on input items, such as seed, fertilizer, hired labor and power. Although not a common cost item, the value of rent paid was included in variable costs as reported.

(2) Inputed family labor costs--derived on the basis of hours of family labor used times the hourly wage rate paid for hired labor.

(3) Total costs--variable costs plus imputed family labor costs.

(4) Value of product--measured by the yield of main product times the price received for the product. Values of secondary products, such as cereal straw, were recorded separately and used as supplementary information concerning costs and returns.

(5) Gross margin--the value of product less variable costs and rent paid represents returns above cash costs.

(6) Net earnings--value of production less total costs represent the return to farm holders' resources and management.

Appendix 3

Farm Survey Costs and Returns Tables by RPU and Region

Appendix Table 1. Estimated Production Costs and Returns for Local Wheat by Resource Planning Unit, Farm Size and Region, Coastal Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
28-S	86	137	105	46	40	86	59	19
28-M	73	149	112	142	12	154	-30	-42
28-L	-	-	-	-	-	-	-	-
All	84	143	109	97	35	132	12	-23

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 2. Estimated Production Costs and Returns for Local Wheat by Resource Planning Unit, Farm Size and Region, Coastal Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per100 Kg)1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
28-S	86	137	77	34	29	63	43	14
28-M	73	149	75	95	8	103	-20	-28
28-L	-	-	-	-	-	-	-	-
All	84	143	76	68	17	85	8	-9

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 3. Estimated Production Costs and Returns for Local Wheat by Resource Planning Unit, Farm Size and Region, Mountains Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga- tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/ Value of Produc- tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
29-S	0	61	44	60	8	68	-16	-24
29-M	0	57	41	51	0	51	-10	-10
29-L	-	-	-	-	-	-	-	-
All	0	58	42	53	2	54	-11	-13
30-S	6	102	63	61	59	120	2	-57
30-M	75	147	106	66	70	136	40	-30
30-L	-	-	-	-	-	-	-	-
All	9	103	64	61	59	120	3	-56
36-S	0	85	60	49	51	100	11	-40
36-M	0	94	70	55	8	63	15	7
36-L	0	78	59	27	4	31	32	28
All	0	83	61	39	24	63	22	-2
37-S	0	54	41	18	0	18	23	23
37-M	0	90	67	39	26	65	28	2
37-L	-	-	-	-	-	-	-	-
All	0	64	48	24	21	45	24	3
58-S	0	85	63	42	58	100	21	-37
58-M	0	78	58	51	32	83	7	-25
58-L	-	-	-	-	-	-	-	-
All	0	78	58	50	34	84	8	-26
MT-S	5	84	57	47	42	89	10	-32
MT-M	24	83	61	50	15	65	11	- 4
MT-L	0	78	59	27	4	31	32	28
All	6	82	58	43	28	71	15	-13

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 4. Estimated Production Costs and Returns for Local Wheat by Resource Planning Unit, Farm Size and Region, Mountains Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga- tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/					
			Value of Produc- tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
29-S	0	61	72	98	13	111	-26	-39
29-M	0	57	72	90	0	90	-18	-18
29-L	-	-	-	-	-	-	-	-
All	0	58	72	92	3	95	-20	-23
30-S	6	102	62	60	58	118	2	-56
30-M	75	147	72	45	48	93	27	-21
30-M	-	-	-	-	-	-	-	-
All	9	103	62	59	58	117	3	-55
36-S	0	85	71	58	60	118	13	-47
36-M	0	94	74	58	9	67	16	7
36-L	0	78	76	35	5	40	41	36
All	0	83	74	48	29	77	26	- 3
37-S	0	54	76	33	0	33	43	43
37-M	0	90	74	43	29	72	31	2
37-L	-	-	-	-	-	-	-	-
All	0	64	75	37	11	48	38	27
58-S	0	85	74	49	32	81	25	- 7
58-M	0	78	74	65	41	106	9	-32
58-L	-	-	-	-	-	-	-	-
All	0	78	64	40	104	10		-30
MT-S	5	84	68	56	50	116	12	-48
MT-M	24	83	74	60	18	78	14	- 4
MT-L	0	78	76	35	5	40	41	36
All	6	82	71	52	34	86	19	-15

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 5. Estimated Production Costs and Returns for Local Wheat by Resource Planning Unit, Farm Size and Lowlands Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga- tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom)1/					
			Value of Produc- tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
26-S	50	98	59	43	4	47	16	12
26-M	78	66	43	31	2	33	12	10
26-L	80	72	44	50	3	53	-6	-9
All	64	77	48	38	3	41	10	7
34-S	29	208	174	168	52	220	6	-46
34-M	100	277	218	95	62	157	123	61
34-L	100	112	79	128	9	137	-49	-58
All	48	236	188	123	53	176	65	12
35-S	100	210	132	109	33	142	23	-10
35-M	-	-	-	-	-	-	-	-
35-L	-	-	-	-	-	-	-	-
All	100	210	132	109	33	142	23	-10
47	-	-	-	-	-	-	-	-
L-S	61	134	92	78	18	96	14	-4
L-M	81	116	85	46	16	62	39	23
L-L	88	78	50	62	4	66	-12	-16
All	68	116	82	49	15	64	33	18

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 6. Estimated Production Costs and Returns for Local Wheat by Resource Planning Unit, Farm Size and Lowlands Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga-tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/ Value of Produc-tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
26-S	50	98	60	44	4	48	16	12
26-M	78	66	65	47	3	50	18	15
26-L	80	72	61	69	4	73	-8	-12
All	64	77	62	49	4	53	13	9
34-S	29	208	84	81	25	106	3	-22
34-M	100	277	79	34	22	56	45	23
34-L	100	112	70	114	8	122	-44	-52
All	48	236	80	52	22	74	28	6
35-S	100	210	63	52	16	68	11	- 5
35-M	-	-	-	-	-	-	-	-
35-L	-	-	-	-	-	-	-	-
All	100	210	63	52	16	68	11	- 5
47	-	-	-	-	-	-	-	-
L-S	61	134	69	58	13	71	11	- 2
L-M	81	116	73	40	14	54	33	19
L-L	88	78	63	80	5	85	-17	-22
All	68	116	70	51	13	64	19	6

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 7. Estimated Production Costs and Returns for Local Wheat by Resource Planning Unit, Farm Size and Undulating Plains Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
20-S	-	-	-	-	-	-	-	-
20-M	50	119	83	22	20	42	61	41
20-L	49	160	112	112	20	132	0	-20
All	49	149	105	90	20	110	15	- 5
23-S	100	286	182	132	50	182	50	0
23-M	100	222	143	104	26	130	39	13
23-L	100	250	162	108	7	115	54	47
All	100	232	149	108	30	138	41	11
24-S	0	0	0	6	0	6	- 6	- 6
24-M	0	10	6	12	2	14	- 6	- 8
24-L	0	28	18	18	2	20	0	- 2
All	0	16	10	14	2	16	- 4	- 6
25-S	0	69	51	42	31	73	9	-22
25-M	0	95	75	38	18	56	37	19
25-L	-	-	-	-	-	-	-	-
All	0	79	60	40	26	66	20	- 6
27-S	0	143	116	90	48	138	26	-22
27-M	0	71	45	57	24	81	-12	-36
27-L	-	-	-	-	-	-	-	-
All	0	89	63	66	30	96	- 3	-33
38-S	0	89	59	40	2	42	19	17
38-M	1	71	54	32	0	32	22	22
38-L	0	75	60	33	0	33	27	27
All	0	79	56	35	1	36	21	20
48-S	-	-	-	-	-	-	-	-
48-M	0	24	16	18	0	18	- 2	- 2
48-L	-	-	-	-	-	-	-	-
All	0	24	16	18	0	18	- 2	- 2
49-S	0	52	34	20	0	20	14	14
49-M	-	-	-	-	-	-	-	-
49-L	15	52	36	16	0	16	20	20
All	10	52	36	16	0	16	20	20
57-S	0	22	14	7	2	9	7	5
57-M	0	28	20	10	5	15	10	5
57-L	0	25	18	10	0	10	8	8
All	0	26	19	10	2	12	9	7

(Continued)

Appendix Table 7. (Cont) Estimated Production Costs and Returns for Local Wheat by Resource Planning Unit, Farm Size and Undulating Plains Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
UP-S	6	76	53	38	12	50	15	3
UP-M	23	52	37	23	6	29	14	8
UP-L	34	48	34	24	2	26	10	8
All	30	56	39	26	6	32	13	7

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 8. Estimated Production Costs and Returns for Local Wheat by Resource Planning Unit, Farm Size and Undulating Plains Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
20-S	-	-	-	-	-	-	-	-
20-M	50	119	70	18	17	35	52	35
20-L	49	160	70	70	12	82	0	-12
All	49	149	70	59	13	72	11	- 2
23-S	100	286	64	46	17	63	18	1
23-M	100	222	64	47	12	59	17	5
23-L	100	250	65	43	3	46	22	19
All	100	232	64	47	13	60	17	4
24-S	0	0	0	0	0	0	0	0
24-M	0	10	60	120	20	140	-60	-80
24-L	0	28	64	64	7	71	0	- 7
All	0	16	63	84	12	96	-21	-33
25-S	0	69	74	61	45	106	13	-32
25-M	0	95	79	40	19	59	39	20
25-L	-	-	-	-	-	-	-	-
All	0	79	76	52	33	85	24	- 9
27-S	0	143	81	63	34	97	18	-16
27-M	0	71	63	80	34	114	-17	-51
27-L	-	-	-	-	-	-	-	-
All	0	89	70	74	34	108	- 4	-38
38-S	0	89	66	45	2	47	21	19
38-M	1	71	76	45	0	45	31	31
38-L	0	75	80	44	0	44	36	36
All	0	79	72	45	1	46	27	26
48-S	-	-	-	-	-	-	-	-
48-M	0	24	67	75	0	75	- 8	- 8
48-L	-	-	-	-	-	-	-	-
All	0	24	67	75	0	75	- 8	- 8
49-S	0	52	65	38	0	38	27	27
49-M	-	-	-	-	-	-	-	-
49-L	15	52	69	31	0	31	38	38
All	10	52	69	32	0	32	37	37
57-S	0	22	64	32	9	42	32	23
57-M	0	28	71	36	18	54	35	17
57-L	0	25	72	40	0	40	32	32
All	0	26	71	37	10	47	34	24

(Continued)

Appendix Table 8. (Cont) Estimated Production Costs and Returns for Local Wheat by Resource Planning Unit, Farm Size and Undulating Plains Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
UP-S	6	76	69	49	16	65	20	4
UP-M	23	52	72	45	11	56	27	16
UP-L	34	48	71	50	5	55	21	16
All	30	56	71	47	11	58	24	13

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 9. Estimated Production Costs and Returns for Local Wheat by Resource Planning Unit, Farm Size and Euph. & Tributaries Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. PerDunom) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
32-S	100	221	177	124	68	192	53	-15
32-M	100	196	160	114	24	138	46	22
32-L	100	250	175	108	31	139	67	36
All	100	204	164	115	32	147	49	17
40-S	0	30	21	23	9	32	-2	-11
40-M	54	87	72	32	27	59	40	13
40-L	0	50	30	24	0	24	6	6
All	30	57	44	27	16	43	17	1
42	-	-	-	-	-	-	-	-
E&T-S	72	99	77	59	30	89	18	-12
E&T-M	94	164	134	90	25	115	44	19
E&T-L	91	139	94	61	14	75	33	19
All	88	143	114	78	25	103	36	11

1/ Weighted by total number of dunom
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 10. Estimated Production Costs and Returns for Local Wheat by Resource Planning Unit, Farm Size and Euph. & Tributaries Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
32-S	100	221	80	56	31	87	24	-7
32-M	100	196	82	58	12	70	24	12
32-L	100	250	70	43	12	55	27	15
All	100	204	81	56	15	71	25	10
40-S	0	30	70	77	30	107	-7	-37
40-M	54	87	83	37	31	68	46	15
40-L	0	50	60	48	0	48	12	12
All	30	57	78	47	27	74	31	4
42	-	-	-	-	-	-	-	-
E&T-S	72	99	78	60	31	91	18	-13
E&T-M	94	164	82	55	15	70	27	12
E&T-L	91	139	68	44	10	54	24	14
All	88	143	80	55	18	73	25	7

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 11. Estimated Production Costs and Returns for Local Wheat by Resource Planning Unit, Farm Size and Northeast Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga- tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/					
			Value of Produc- tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
38-S	0	89	59	40	2	42	19	17
38-M	1	71	54	32	0	32	22	22
38-L	0	75	60	33	0	33	27	27
All	0	79	56	35	1	36	21	20
41-S	75	156	106	48	17	65	58	41
41-M	57	119	73	39	17	56	34	17
41-L	0	54	35	10	3	13	25	22
All	61	117	74	37	15	52	37	22
45-S	-	-	-	-	-	-	-	-
45-M	0	51	41	17	0	17	27	24
45-L	0	98	81	27	0	27	54	54
All	0	79	65	23	0	23	42	42
46-S	0	60	41	10	2	12	31	29
46-M	6	58	40	21	0	21	19	19
46-L	-	-	-	-	-	-	-	-
All	5	58	40	21	0	21	19	19
50-S	0	86	67	31	20	51	36	16
50-M	0	87	69	28	12	40	41	29
50-L	-	-	-	-	-	-	-	-
All	0	87	69	29	14	43	40	26
51-S	100	233	163	77	20	97	86	66
51-M	67	132	92	50	12	62	42	30
51-L	0	72	54	24	3	27	30	27
All	64	76	56	26	4	30	30	26
52-S	0	85	66	31	0	31	35	35
52-M	0	95	68	24	0	24	44	44
52-L	71	110	76	37	0	37	39	39
All	8	98	70	29	0	29	41	41
53-S	0	100	60	23	0	23	37	37
53-M	-	-	-	-	-	-	-	-
53-L	-	-	-	-	-	-	-	-
All	0	100	60	23	0	23	37	37
54-S	0	131	102	25	0	25	77	77
54-M	-	-	-	-	-	-	-	-
54-L	-	-	-	-	-	-	-	-
All	0	131	102	25	0	25	77	77

(Continued)

Appendix Table 11.(Cont) Estimated Production Costs and Returns for Local Wheat by Resource Planning Unit, Farm Size and Northeast Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga- tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/ Value of Produc- tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
55-S	0	113	73	25	0	25	48	48
55-M	-	-	-	-	-	-	-	-
55-L	-	-	-	-	-	-	-	-
All	0	113	73	25	0	25	48	48
56-S	0	130	86	38	0	138	48	48
56-M	0	185	122	56	0	56	66	66
56-L	-	-	-	-	-	-	-	-
All	0	177	177	53	0	53	64	64
NE-S	25	102	71	34	2	36	37	35
NE-M	20	85	60	29	2	31	31	29
NE-L	10	86	65	28	2	30	37	35
All	20	89	64	30	2	32	34	32

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 12. Estimated Production Costs and Returns for Local Wheat by Resource Planning Unit, Farm Size and Northeast Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
38-S	0	89	66	45	2	47	21	19
38-M	1	71	76	45	0	45	31	31
38-L	0	75	80	44	0	44	36	36
All	0	79	71	45	0	45	26	26
41-S	75	156	68	31	11	42	37	26
41-M	57	119	61	33	14	47	28	14
41-L	0	54	64	18	6	24	46	40
All	61	117	63	32	13	45	31	18
45-S	-	-	-	-	-	-	-	-
45-M	0	51	80	33	0	33	47	47
45-L	0	98	83	28	0	28	55	55
All	0	79	82	29	0	29	53	53
46-S	0	60	68	17	3	20	51	48
46-M	6	58	69	36	0	36	63	33
46-L	-	-	-	-	-	-	-	-
All	5	58	69	35	0	35	34	34
50-S	0	86	78	36	23	59	42	19
50-M	0	87	79	32	14	46	47	33
50-L	-	-	-	-	-	-	-	-
All	0	87	79	33	16	49	46	30
51-S	100	233	70	33	8	41	37	29
51-M	67	132	70	38	9	47	32	23
51-L	0	72	75	33	4	37	42	38
All	64	76	74	33	4	37	41	37
52-S	0	85	78	36	0	36	42	42
52-M	0	95	72	25	0	25	47	47
52-L	71	110	69	34	0	34	35	35
All	8	98	72	30	0	30	42	42
53-S	0	100	60	23	0	23	37	37
53-M	-	-	-	-	-	-	-	-
53-L	-	-	-	-	-	-	-	-
All	0	100	60	23	0	23	37	37
54-S	0	131	78	19	0	19	59	59
54-M	-	-	-	-	-	-	-	-
54-L	-	-	-	-	-	-	-	-
All	0	131	78	19	0	19	59	59

(Continued)

Appendix Table 12. (Cont) Estimated Production Costs and Returns for Local Wheat by Resource Planning Unit, Farm Size and Northeast Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
55-S	0	113	65	22	0	22	43	43
55-M	-	-	-	-	-	-	-	-
55-L	-	-	-	-	-	-	-	-
All	0	113	65	22	0	22	43	43
56-S	0	130	66	29	0	29	37	37
56-M	0	185	66	30	0	30	36	36
56-L	-	-	-	-	-	-	-	-
All	0	177	66	30	0	30	36	36
NE-S	25	102	79	33	2	35	46	44
NE-M	20	85	71	34	3	37	37	34
NE-L	10	86	76	32	2	34	44	42
All	20	89	74	33	2	35	41	39

1/ Weighted by total production of Kg.
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 13. Estimated Production Costs and Returns for Local Wheat by Resource Planning Unit, Farm Size and Southwest Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga-tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/ Value of Produc-tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
2-S	0	47	36	22	29	51	14	-15
2-M	0	42	32	33	0	33	- 1	- 1
2-L	0	25	20	18	0	18	2	2
All	0	41	31	28	9	37	3	- 6
3-S	100	234	152	79	54	133	73	19
3-M	100	278	181	89	6	95	92	86
3-L	75	187	121	61	8	69	60	52
All	96	249	162	81	12	93	81	69
4-S	0	51	33	22	20	42	11	- 9
4-M	0	39	29	26	10	36	3	- 7
4-L	0	29	20	35	9	44	-13	-24
All	0	39	28	27	11	38	1	-10
5-S	0	56	41	31	22	53	10	-12
5-M	0	96	71	44	19	63	27	8
5-L	0	92	69	27	44	71	42	- 2
All	0	72	53	33	26	59	20	- 6
8-S	0	27	18	12	8	20	6	- 2
8-M	0	11	7	9	6	15	- 2	- 8
8-L	0	27	17	9	8	17	8	0
All	0	14	9	10	6	16	- 1	- 7
9-S	94	158	123	63	77	140	60	-17
9-M	67	132	94	45	26	71	49	23
9-L	9	39	30	25	7	32	5	- 2
All	83	131	98	49	44	93	49	5
10-S	33	53	37	37	60	97	0	-60
10-M	100	100	65	70	28	98	- 5	-33
10-L	100	138	103	77	7	84	26	19
All	74	112	80	69	22	91	11	-11
15-S	14	92	71	41	30	71	30	0
15-M	52	85	61	52	44	96	9	-35
15-L	62	91	70	53	9	62	17	8
All	19	91	69	44	31	75	25	- 6
16-S	0	64	51	22	30	52	29	- 1
16-M	-	-	-	-	-	-	-	-
16-L	-	-	-	-	-	-	-	-
All	0	64	51	22	30	52	29	- 1

(Continued)

Appendix Table 13. (Cont) Estimated Production Costs and Returns for Local Wheat by Resource Planning Unit, Farm Size and Southwest Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
A11-S	24	78	59	33	32	65	26	- 6
A11-M	28	65	46	33	11	44	13	2
A11-L	30	65	46	35	12	47	11	1
A11	26	70	51	33	19	52	18	- 1

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 14. Estimated Production Costs and Returns for Local Wheat by Resource Planning Unit, Farm Size and Southwest Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per100 Kg)1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
2-S	0	47	77	47	62	109	30	-32
2-M	0	42	76	79	0	79	- 3	- 3
2-L	0	25	80	72	0	72	8	8
All	0	41	77	68	19	87	9	-10
3-S	100	234	65	34	23	57	31	8
3-M	100	278	65	32	2	34	33	31
3-L	75	187	65	33	4	37	32	28
All	96	249	65	32	5	37	33	28
4-S	0	51	65	43	39	82	22	-17
4-M	0	39	74	67	26	93	7	-19
4-L	0	29	69	121	31	152	-52	-83
All	0	37	72	70	29	99	2	-27
5-S	0	56	73	55	39	94	18	-21
5-M	0	96	74	46	20	66	28	8
5-L	0	92	75	29	48	77	46	- 2
All	0	77	74	45	36	81	29	- 7
8-S	0	27	67	44	30	74	23	- 7
8-M	0	11	64	82	54	136	-18	-72
8-L	0	27	63	33	30	63	30	0
All	0	18	64	63	44	107	1	-43
9-S	94	158	78	40	49	89	38	-11
9-M	67	132	71	34	20	54	37	17
9-L	9	39	78	64	18	82	14	- 4
All	83	131	74	38	34	72	36	2
10-S	33	53	70	70	113	183	0	-113
10-M	100	100	65	70	28	98	- 5	- 33
10-L	100	138	75	56	5	61	19	14
All	74	120	71	62	20	82	9	- 11
15-S	14	92	77	45	33	78	32	- 1
15-M	52	85	72	61	52	113	11	- 41
15-L	62	91	77	58	10	68	19	9
All	19	91	76	48	35	83	28	- 7
16-S	0	64	80	34	47	81	46	- 1
16-M	-	-	-	-	-	-	-	-
16-L	-	-	-	-	-	-	-	-
All	0	64	80	34	47	81	46	- 1

(Continued)

Appendix Table 14.(Cont) Estimated Production Costs and Returns for Local Wheat by Resource Planning Unit, Farm Size and Southwest Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga-tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per100 Kg)1/					
			Value of Produc-tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
A11-S	24	78	76	43	41	84	33	- 8
A11-M	28	65	70	51	17	68	19	2
A11-L	30	65	72	55	19	74	17	- 2
A11	26	70	73	48	27	75	25	- 2

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 15. Estimated Production Costs and Returns for Local Wheat by Resource Planning Unit, Farm Size and Steppe Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
1-S	0	50	38	21	28	49	17	-11
1-M	0	46	36	29	2	31	7	5
1-L	-	-	-	-	-	-	-	-
All	0	46	36	28	6	34	8	2
13-S	17	73	57	27	33	60	30	- 3
13-M	42	51	40	41	20	61	- 1	-21
13-L	67	350	252	160	141	301	92	-49
All	32	59	46	36	25	61	10	-15
17-S	0	0	0	87	0	87	-87	-87
17-M	50	69	54	38	29	67	16	-13
17-L	62	214	148	82	34	116	66	32
All	36	69	51	64	19	83	-13	-32
18-S	0	0	0	10	0	10	-10	-10
18-M	50	27	20	16	0	16	4	4
18-L	100	17	13	14	4	18	- 1	- 5
All	20	13	10	13	1	14	- 3	- 4
19-S	13	94	73	36	32	68	37	5
19-M	19	24	18	12	7	19	6	- 1
19-L	50	51	39	19	4	23	20	16
All	15	34	26	15	9	24	11	2
21-S	0	80	66	10	9	19	56	47
21-M	-	-	-	-	-	-	-	-
21-L	-	-	-	-	-	-	-	-
All	0	80	66	10	9	19	56	47
31-S	0	29	21	18	10	28	3	- 7
31-M	15	51	38	36	9	45	2	- 7
31-L	20	30	22	16	1	17	6	5
All	13	40	30	26	6	32	4	- 2
33	-	-	-	-	-	-	-	-
39-S	-	-	-	-	-	-	-	-
39-M	0	28	21	13	10	23	8	- 2
39-L	0	50	38	34	9	43	4	- 5
All	0	31	24	16	10	26	8	- 2
41-S	75	156	106	48	17	65	58	41
41-M	57	119	73	39	17	56	34	17
41-L	0	54	38	10	3	13	28	25
All	61	117	74	37	15	52	37	22

(Continued)

Appendix Table 15.(Cont)Estimated Production Costs and Returns for Local Wheat by Resource Planning Unit, Farm Size and Steppe Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
ST-S	12	66	52	25	15	40	27	12
ST-M	36	49	35	27	11	38	8	- 3
ST-L	51	53	38	23	6	29	15	9
All	24	55	40	26	12	38	14	2

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 16. Estimated Production Costs and Returns for Local Wheat by Resource Planning Unit, Farm Size and Steppe Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
1-S	0	50	77	42	56	98	25	-21
1-M	0	46	79	63	4	67	16	12
1-L	-	-	-	-	-	-	-	-
All	0	46	79	60	11	71	19	8
13-S	17	73	78	37	45	82	41	- 4
13-M	42	51	78	80	39	119	- 2	-41
13-L	67	350	72	46	40	86	26	-14
All	32	59	77	59	41	100	18	3
17-S	0	0	0	0	0	0	0	0
17-M	50	69	78	55	42	97	23	-19
17-L	62	214	69	38	16	54	31	15
All	36	69	73	46	28	74	27	- 1
18-S	0	0	0	0	0	0	0	0
18-M	50	27	74	59	0	59	15	15
18-L	100	17	74	82	24	106	- 8	-32
All	20	13	74	65	6	71	9	3
19-S	13	94	78	38	34	72	40	6
19-M	19	24	75	50	29	79	25	- 4
19-L	50	51	76	37	8	45	39	31
All	15	34	76	45	30	75	31	1
21-S	0	80	82	12	11	23	70	59
21-M	-	-	-	-	-	-	-	-
21-L	-	-	-	-	-	-	-	-
All	0	80	82	12	11	23	70	59
31-S	0	29	72	62	34	96	10	-24
31-M	15	51	74	71	18	89	3	-15
31-L	20	30	73	53	3	56	20	17
All	13	40	74	65	14	79	9	- 5
33	-	-	-	-	-	-	-	-
39-S	-	-	-	-	-	-	-	-
39-M	0	28	75	46	36	82	29	- 7
39-L	0	50	76	68	18	86	8	-10
All	0	31	75	51	33	84	24	-9
41-S	75	156	68	31	11	42	37	26
41-M	57	119	61	33	14	47	28	14
41-L	0	54	70	18	6	24	52	46
All	61	117	63	32	13	45	31	18

(Continued)

Appendix Table 16. (Cont) Estimated Production Costs and Returns for Local Wheat by Resource Planning Unit, Farm Size and Steppe Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
ST-S	12	66	79	24	22	46	55	23
ST-M	36	49	72	55	22	77	17	- 5
ST-L	51	53	71	44	11	55	27	16
All	24	55	74	42	21	63	32	11

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 17. Estimated Production Costs and Returns for Mexican Wheat by Resource Planning Unit, Farm Size and Region, Mountains Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
29	-	-	-	-	-	-	-	-
30-S	0	272	196	45	68	113	151	83
30-M	-	-	-	-	-	-	-	-
30-L	-	-	-	-	-	-	-	-
All	0	272	196	45	68	113	151	83
36-S	-	-	-	-	-	-	-	-
36-M	0	45	33	26	12	38	7	- 5
36-L	0	65	46	40	12	52	6	- 6
All	0	51	37	30	12	42	7	- 5
37	-	-	-	-	-	-	-	-
58	-	-	-	-	-	-	-	-
MT-S	0	272	196	45	68	113	151	83
MT-M	0	45	33	26	12	38	7	- 5
MT-L	0	65	46	40	12	52	6	- 6
All	0	72	52	32	17	49	20	3

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 18. Estimated Production Costs and Returns for Mexican Wheat by Resource Planning Unit, Farm Size and Region, Mountains Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per100 Kg)1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
29	-	-	-	-	-	-	-	-
30-S	0	272	72	16	25	41	56	31
30-M	-	-	-	-	-	-	-	-
30-L	-	-	-	-	-	-	-	-
All	0	272	72	16	25	41	56	31
36-S	-	-	-	-	-	-	-	-
36-M	0	45	73	58	27	85	15	-12
36-L	0	65	71	62	18	80	9	- 9
All	0	52	72	59	24	84	13	-11
37	-	-	-	-	-	-	-	-
58	-	-	-	-	-	-	-	-
MT-S	0	272	72	16	25	41	56	31
MT-M	0	45	73	58	27	85	15	-12
MT-L	0	65	71	62	18	80	9	- 9
All	0	72	72	44	25	69	28	3

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 19. Estimated Production Costs and Returns for Mexican Wheat by Resource Planning Unit, Farm Size and Lowlands Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom)1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
26-S	0	100	64	32	25	57	32	7
26-M	50	116	79	52	9	61	27	18
26-L	-	-	-	-	-	-	-	-
All	31	115	78	51	10	61	27	17
34-S	0	96	72	70	2	72	2	0
34-M	88	124	79	62	9	71	17	8
34-L	-	-	-	-	-	-	-	-
All	86	121	78	63	8	71	15	7
35-S	-	-	-	-	-	-	-	-
35-M	-	-	-	-	-	-	-	-
35-L	0	87	61	66	2	68	-5	-7
All	0	87	61	66	2	68	-5	-7
47	-	-	-	-	-	-	-	-
L-S	0	97	70	61	8	69	9	1
L-M	87	121	79	53	9	62	26	17
L-L	0	87	61	66	2	68	- 5	- 7
All	84	119	78	54	9	63	24	15

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 20. Estimated Production Costs and Returns for Mexican Wheat by Resource Planning Unit, Farm Size and Lowlands Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
26-S	0	100	64	32	25	57	32	7
26-M	50	116	68	45	8	53	23	15
26-L	-	-	-	-	-	-	-	-
All	31	115	68	44	9	53	24	15
34-S	0	96	75	73	2	75	2	0
34-M	88	124	64	50	7	57	14	7
34-L	-	-	-	-	-	-	-	-
All	86	121	65	52	7	59	13	6
35-S	-	-	-	-	-	-	-	-
35-M	-	-	-	-	-	-	-	-
35-L	0	87	70	76	2	78	- 8	-10
All	0	87	70	76	2	78	- 8	-10
47	-	-	-	-	-	-	-	-
L-S	0	97	72	63	8	71	9	1
L-M	87	121	65	48	7	55	17	10
L-L	0	87	70	76	2	78	- 6	- 8
All	84	119	66	49	7	56	17	10

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 21. Estimated Production Costs and Returns for Mexican Wheat by Resource Planning Unit, Farm Size and Undulating Plains Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
20	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-
38-S	0	69	51	30	2	32	21	19
38-M	-	-	-	-	-	-	-	-
38-L	-	-	-	-	-	-	-	-
All	0	69	51	30	2	32	21	19
48	-	-	-	-	-	-	-	-
49	-	-	-	-	-	-	-	-
57-S	0	61	42	24	0	24	18	18
57-M	0	40	26	18	0	18	8	8
57-L	-	-	-	-	-	-	-	-
All	0	45	30	19	0	19	11	11
UP-S	0	66	48	28	1	29	30	29
UP-M	0	40	26	18	0	18	8	8
UP-L	-	-	-	-	-	-	-	-
All	0	53	37	23	1	24	14	13

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 22. Estimated Production Costs and Returns for Mexican Wheat by Resource Planning Unit, Farm Size and Undulating Plains Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
20	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-
38-S	0	69	74	44	3	47	30	27
38-M	-	-	-	-	-	-	-	-
38-L	-	-	-	-	-	-	-	-
All	0	69	74	44	3	47	30	27
48	-	-	-	-	-	-	-	-
49	-	-	-	-	-	-	-	-
57-S	0	61	69	40	0	40	29	29
57-M	0	40	65	45	0	45	20	20
57-L	-	-	-	-	-	-	-	-
All	0	45	66	43	0	43	23	23
UP-S	0	66	73	43	2	45	30	28
UP-M	0	40	65	45	0	45	20	20
UP-L	-	-	-	-	-	-	-	-
All	0	53	70	44	1	45	26	25

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 23. Estimated Production Costs and Returns for Mexican Wheat by Resource Planning Unit, Farm Size and Euph. & Tributaries Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga- tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/					
			Value of Produc- tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
32-S	100	247	198	106	74	180	92	18
32-M	100	100	80	78	10	88	2	-8
32-L	100	200	160	109	20	129	51	31
All	100	152	122	93	17	110	29	12
40-S	100	333	241	90	77	167	151	74
40-M	100	348	244	91	27	118	153	126
40-L	-	-	-	-	-	-	-	-
All	100	343	243	91	45	136	152	107
42	-	-	-	-	-	-	-	-
E&T-S	100	321	235	92	77	169	143	66
E&T-M	100	216	157	84	18	102	73	55
E&T-L	100	200	160	109	20	129	51	31
All	100	229	171	92	28	120	79	51

1/ Weighted by total number of dunom
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 24. Estimated Production Costs and Returns for Mexican Wheat by Resource Planning Unit, Farm Size and Euph. & Tributaries Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per100 Kg)1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
32-S	100	247	80	43	30	73	37	7
32-M	100	100	80	78	10	88	2	-8
32-L	100	200	80	54	10	64	26	16
All	100	152	80	61	11	72	19	8
40-S	100	333	72	27	23	50	45	22
40-M	100	348	70	26	8	34	44	36
40-L	-	-	-	-	-	-	-	-
All	100	343	71	26	13	39	45	32
42	-	-	-	-	-	-	-	-
E&T-S	100	321	77	29	24	53	48	24
E&T-M	100	216	72	34	8	42	38	30
E&T-L	100	200	80	54	10	64	26	54
All	100	229	75	38	12	50	37	25

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 25. Estimated Production Costs and Returns for Mexican Wheat by Resource Planning Unit, Farm Size and Northeast Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
38-S	0	69	51	30	2	32	21	19
38-M	-	-	-	-	-	-	-	-
38-L	-	-	-	-	-	-	-	-
All	0	69	51	30	2	32	21	19
41	-	-	-	-	-	-	-	-
45-S	-	-	-	-	-	-	-	-
45-M	100	265	194	70	50	120	124	74
45-L	57	204	149	98	16	116	51	35
All	64	207	151	97	18	115	54	36
46	-	-	-	-	-	-	-	-
50	-	-	-	-	-	-	-	-
51	-	-	-	-	-	-	-	-
52-S	-	-	-	-	-	-	-	-
52-M	50	103	75	40	0	40	35	35
52-L	67	121	85	70	4	74	15	11
All	60	119	84	66	4	70	18	14
53-S	33	92	69	42	0	42	27	27
53-M	50	124	89	83	8	91	6	-2
53-L	100	100	75	49	7	56	26	19
All	56	111	82	65	7	72	17	10
54-S	0	55	38	24	0	24	14	14
54-M	0	56	39	25	0	25	14	14
54-L	-	-	-	-	-	-	-	-
All	0	55	38	24	0	24	14	14
55-S	0	84	55	28	0	28	27	27
55-M	-	-	-	-	-	-	-	-
55-L	-	-	-	-	-	-	-	-
All	0	84	55	28	0	28	27	27
56-S	-	-	-	-	-	-	-	-
56-M	-	-	-	-	-	-	-	-
56-L	0	180	108	44	0	44	64	64
All	0	180	108	44	0	44	64	64

(Continued)

Appendix Table 25. (Cont) Estimated Production Costs and Returns for Mexican Wheat by Resource Planning Unit, Farm Size and Northeast Type of Farming Region, Cropyear 1977-1978, S.A.R.

			Production Costs and Returns (S.L. Per Dunom) 1/					
RPU and Farm Size	Extent of Irriga-tion 2/ (Pct.)	Yield (Kg)/ Dunom	Value of Produc-tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
NE-S	6	58	40	25	0	25	15	15
NE-M	16	119	86	65	9	74	21	12
NE-L	59	158	113	77	10	87	36	26
All	25	103	73	49	4	53	24	20

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 26. Estimated Production Costs and Returns for Mexican Wheat by Resource Planning Unit, Farm Size and Northeast Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga- tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/ Value of Produc- tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
38-S	0	69	74	44	3	47	30	27
38-M	-	-	-	-	-	-	-	-
38-L	-	-	-	-	-	-	-	-
All	0	69	74	44	3	47	30	27
41	-	-	-	-	-	-	-	-
45-S	-	-	-	-	-	-	-	-
45-M	100	265	73	26	19	45	47	28
45-L	57	204	73	48	8	56	25	17
All	64	207	73	47	9	56	26	17
46	-	-	-	-	-	-	-	-
50	-	-	-	-	-	-	-	-
51	-	-	-	-	-	-	-	-
52-S	-	-	-	-	-	-	-	-
52-M	50	103	73	39	0	39	34	34
52-L	67	121	70	58	3	61	12	9
All	60	119	70	56	3	59	14	11
53-S	33	92	75	47	0	47	28	28
53-M	50	124	72	67	6	73	5	-1
53-L	100	100	75	49	7	56	26	19
All	56	111	74	58	6	64	16	10
54-S	0	55	69	44	0	44	25	25
54-M	0	56	70	45	0	45	25	25
54-L	-	-	-	-	-	-	-	-
All	0	55	69	44	0	44	25	25
55-S	0	84	65	33	0	33	32	32
55-M	-	-	-	-	-	-	-	-
55-L	-	-	-	-	-	-	-	-
All	0	84	65	33	0	33	32	32
56-S	-	-	-	-	-	-	-	-
56-M	-	-	-	-	-	-	-	-
56-L	0	180	60	24	0	24	36	36
All	0	180	60	24	0	24	36	36

(Continued)

Appendix Table 26. (Cont)Estimated Production Costs and Returns for Mexican Wheat by Resource Planning Unit, Farm Size and Northeast Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
NE-S	6	58	70	43	0	43	27	27
NE-M	16	119	72	54	7	54	18	11
NE-L	59	158	72	49	6	55	23	17
All	25	103	71	47	4	51	24	20

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 27. Estimated Production Costs and Returns for Mexican Wheat by Resource Planning Unit, Farm Size and Steppe Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
1	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-
19-S	0	81	54	25	8	33	29	21
19-M	-	-	-	-	-	-	-	-
19-L	-	-	-	-	-	-	-	-
All	0	81	54	25	8	31	29	23
21	-	-	-	-	-	-	-	-
31-S	100	202	141	85	20	105	56	36
31-M	-	-	-	-	-	-	-	-
31-L	-	-	-	-	-	-	-	-
All	100	202	141	85	20	105	56	36
33	-	-	-	-	-	-	-	-
39	-	-	-	-	-	-	-	-
41	-	-	-	-	-	-	-	-
ST-S	4	99	67	34	10	44	33	23
ST-M	-	-	-	-	-	-	-	-
ST-L	-	-	-	-	-	-	-	-
All	4	99	67	34	10	44	33	23

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 28. Estimated Production Costs and Returns for Mexican Wheat by Resource Planning Unit, Farm Size and Steppe Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
1	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-
19-S	0	81	67	31	10	41	36	26
19-M	-	-	-	-	-	-	-	-
19-L	-	-	-	-	-	-	-	-
All	0	81	67	31	10	41	36	26
21	-	-	-	-	-	-	-	-
31-S	100	202	70	42	10	52	28	18
31-M	-	-	-	-	-	-	-	-
31-L	-	-	-	-	-	-	-	-
All	100	202	70	42	10	52	28	18
33	-	-	-	-	-	-	-	-
39	-	-	-	-	-	-	-	-
41	-	-	-	-	-	-	-	-
ST-S	4	99	68	34	10	44	34	24
ST-M	-	-	-	-	-	-	-	-
ST-L	-	-	-	-	-	-	-	-
All	4	99	68	34	10	44	34	24

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 29. Estimated Production Costs and Returns for Barley by Resource Planning Unit, Farm Size and Region, Coastal Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
28-S	0	223	122	102	83	185	20	-63
28-M	-	-	-	-	-	-	-	-
28-L	-	-	-	-	-	-	-	-
All	0	223	122	102	83	185	20	-63
C-S	0	223	122	102	83	185	20	-63
C-M	-	-	-	-	-	-	-	-
C-L	-	-	-	-	-	-	-	-
All	0	223	122	102	83	185	20	-63

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 30. Estimated Production Costs and Returns for Barley by Resource Planning Unit, Farm Size and Region, Coastal Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunum	Production Costs and Returns (S.L. Per100 Kg)1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
28-S	0	223	55	46	37	83	9	-28
28-M	-	-	-	-	-	-	-	-
28-L	-	-	-	-	-	-	-	-
All	0	223	55	46	37	83	9	-28
C-S	0	223	55	46	37	83	9	-28
C-M	-	-	-	-	-	-	-	-
C-L	-	-	-	-	-	-	-	-
All	0	223	55	46	37	83	9	-28

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 31. Estimated Production Costs and Returns for Barley by Resource Planning Unit, Farm Size and Region, Mountains Type of Farming Region, Cropyear 1977-1978, S.A.R.

			Production Costs and Returns (S.L. Per Dunom) 1/					
RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
29-S	0	47	44	36	20	56	8	-12
29-M	-	-	-	-	-	-	-	-
29-L	-	-	-	-	-	-	-	-
All	0	47	44	36	20	56	8	-12
30-S	34	33	20	23	6	30	-3	- 9
30-M	-	-	-	-	-	-	-	-
30-L	-	-	-	-	-	-	-	-
All	34	33	20	23	6	30	-3	- 9
36-S	0	75	45	34	35	69	11	-24
36-M	0	74	43	18	5	23	25	20
36-L	0	69	42	24	14	38	18	4
All	0	72	43	27	21	48	16	- 5
37-S	0	100	60	17	18	35	43	25
37-M	0	95	57	32	23	55	25	2
37-L	-	-	-	-	-	-	-	-
All	0	97	58	25	69	94	33	-36
58-S	0	34	22	19	15	37	3	-12
58-M	0	40	26	27	18	49	-1	-19
58-L	-	-	-	-	-	-	-	-
All	0	39	26	26	18	44	0	-18
MT-S	13	80	48	29	29	58	19	-10
MT-M	0	74	45	27	17	44	18	1
MT-L	0	69	42	24	14	38	18	4
All	12	74	45	27	16	43	18	2

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 32. Estimated Production Costs and Returns for Barley by Resource Planning Unit, Farm Size and Region, Mountains Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga- tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per100 Kg)1/					
			Value of Produc- tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
29-S	0	47	60	77	42	119	-17	-59
29-M	-	-	-	-	-	-	-	-
29-L	-	-	-	-	-	-	-	-
All	0	33	60	77	42	119	-17	-59
30-S	34	33	62	70	103	-8		-26
30-M	-	-	-	-	-	-	-	-
30-L	-	-	-	-	-	-	-	-
All	34	33	62	70	18	103	-8	-26
36-S	0	75	60	45	47	116	15	-32
36-M	0	74	58	24	7	31	34	27
36-L	0	69	61	35	20	55	26	6
All	0	72	60	38	30	0	0	0
37-S	0	100	60	17	18	35	43	25
37-M	0	95	60	34	24	58	26	2
37-L	-	-	-	-	-	-	-	-
All	0	97	60	26	21	0	0	0
58-S	0	34	65	56	44	156	9	-35
58-M	0	40	65	68	45	163	-3	-48
58-L	-	-	-	-	-	-	-	-
All	0	39	65	67	45	0	0	0
MT-S	13	80	60	36	36	72	24	-12
MT-M	0	74	61	37	23	60	24	1
MT-L	0	69	61	35	20	55	26	6
All	12	74	61	36	27	63	25	-2

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 33. Estimated Production Costs and Returns for Barley by Resource Planning Unit, Farm Size and Lowlands Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/: Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
26-S	0	76	39	60	5	65	-21	-26
26-M	0	92	54	34	15	49	20	5
26-L	-	-	-	-	-	-	-	-
All	0	90	52	37	14	51	15	1
34-S	0	80	44	21	45	66	23	-22
34-M	0	168	100	76	9	85	24	15
34-L	-	-	-	-	-	-	-	-
All	0	126	73	50	26	76	23	- 3
35-S	-	-	-	-	-	-	-	-
35-M	-	-	-	-	-	-	-	-
35-L	17	142	78	74	3	77	4	1
All	17	142	78	74	3	77	4	1
47	-	-	-	-	-	-	-	-
L-S	0	77	40	52	13	65	-12	-25
L-M	0	95	56	36	15	51	20	5
L-L	17	142	78	74	3	77	4	1
All	4	93	54	39	14	53	15	1

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 34. Estimated Production Costs and Returns for Barley by Resource Planning Unit, Farm Size and Lowlands Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga- tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/					
			Value of Produc- tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
26-S	0	76	51	79	7	86	-28	-35
26-M	0	92	59	37	16	53	22	6
26-L	-	-	-	-	-	-	-	-
All	0	90	58	42	15	57	16	1
34-S	0	80	55	26	56	72	29	-27
34-M	0	168	60	45	5	50	15	10
34-L	-	-	-	-	-	-	-	-
All	0	126	58	39	20	59	19	- 1
35-S	-	-	-	-	-	-	-	-
35-M	-	-	-	-	-	-	-	-
35-L	17	142	55	52	2	54	3	1
All	17	142	55	52	2	54	3	1
47	-	-	-	-	-	-	-	-
L-S	0	77	52	68	18	86	-16	-34
L-M	0	95	59	38	15	53	21	6
L-L	17	142	55	52	2	54	3	1
All	4	93	58	42	15	57	16	1

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 35. Estimated Production Costs and Returns for Barley by Resource Planning Unit, Farm Size and Undulating Plains Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. PerDunom) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
20-S	0	102	65	31	16	47	34	18
20-M	25	109	59	26	19	45	33	14
20-L	20	116	71	40	7	47	31	24
All	15	110	63	30	16	46	33	17
23	-	-	-	-	-	-	-	-
24-S	0	0	0	6	1	7	- 6	- 7
24-M	0	7	4	7	1	8	- 3	- 4
24-L	14	33	21	15	3	18	6	3
All	1	11	7	8	1	9	- 1	- 2
25-S	0	93	60	39	25	64	21	- 4
25-M	0	107	59	24	4	28	35	31
25-L	-	-	-	-	-	-	-	-
All	0	98	59	33	17	50	26	9
27-S	0	79	51	40	16	56	11	- 5
27-M	0	143	86	64	13	77	22	- 9
27-L	-	-	-	-	-	-	-	-
All	0	105	68	52	14	66	16	2
38-S	0	88	53	37	5	42	16	11
38-M	0	85	47	30	0	30	17	17
38-L	0	94	54	30	3	33	24	21
All	0	88	51	33	3	36	18	15
48-S	0	37	20	10	14	24	10	- 4
48-M	0	24	13	13	0	13	0	0
48-L	-	-	-	-	-	-	-	-
All	0	24	13	13	0	13	0	0
49-S	0	76	40	21	0	21	19	19
49-M	0	57	27	14	0	14	13	13
49-L	0	24	13	16	0	16	- 3	- 3
All	0	57	27	15	0	15	12	12
57-S	0	24	14	8	8	16	6	- 2
57-M	0	31	17	9	5	14	8	3
57-L	6	36	18	10	0	10	8	8
All	0	33	17	9	3	12	8	5

(Continued)

Appendix Table 35.(Cont) Estimated Production Costs and Returns for Barley by Resource Planning Unit, Farm Size and Undulating Plains Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
UP-S	0	75	46	27	10	37	19	9
UP-M	6	52	27	15	5	20	12	7
UP-L	16	59	34	20	2	22	14	12
All	4	56	31	17	5	22	14	9

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 36. Estimated Production Costs and Returns for Barley by Resource Planning Unit, Farm Size and Undulating Plains Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per100 Kg)1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
20-S	0	102	64	30	22	52	24	2
20-M	25	109	54	24	17	41	30	13
20-L	20	116	61	34	6	40	27	21
All	15	110	57	27	15	42	30	15
23	-	-	-	-	-	-	-	-
24-S	0	0	0	0	0	0	0	0
24-M	0	7	55	100	14	114	-57	-71
24-L	14	33	63	45	9	54	18	9
All	1	11	59	69	11	80	-10	-21
25-S	0	93	64	42	27	69	22	- 5
25-M	0	107	55	22	4	26	33	29
25-L	-	-	-	-	-	-	-	-
All	0	98	60	34	17	51	26	9
27-S	0	79	65	51	20	71	14	- 6
27-M	0	143	60	45	9	54	15	6
27-L	-	-	-	-	-	-	-	-
All	0	105	62	48	14	62	14	0
38-S	0	88	60	42	6	48	18	12
38-M	0	85	55	35	0	35	20	20
38-L	0	94	57	32	3	35	25	22
All	0	88	57	38	3	41	19	16
48-S	0	37	54	27	38	65	27	-11
48-M	0	24	55	54	0	54	1	1
48-L	-	-	-	-	-	-	-	-
All	0	24	55	53	1	54	2	1
49-S	0	76	53	28	0	28	25	25
49-M	0	57	47	25	0	25	22	22
49-L	0	24	54	67	0	67	-13	-13
All	0	57	48	27	0	27	21	21
57-S	0	24	58	33	33	66	25	- 8
57-M	0	31	54	29	16	45	25	9
57-L	6	36	50	27	0	27	23	23
All	0	33	52	28	9	37	24	15

(Continued)

Appendix Table 36.(Cont) Estimated Production Costs and Returns for Barley by Resource Planning Unit, Farm Size and Undulating Plains Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
UP-S	0	75	61	35	15	50	26	11
UP-M	6	52	53	30	10	40	23	13
UP-L	16	59	57	33	4	37	24	20
All	4	56	55	32	9	41	23	14

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 37. Estimated Production Costs and Returns for Barley by Resource Planning Unit, Farm Size and Euph. & Tributaries Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga- tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/ Value of Produc- tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
32-S	-	-	-	-	-	-	-	-
32-M	87	149	96	76	15	91	30	5
32-L	100	100	55	81	8	89	-26	-34
All	88	137	86	77	13	90	9	- 4
40-S	0	22	12	17	6	23	- 5	-11
40-M	8	46	20	13	3	16	7	4
40-L	100	97	52	25	0	25	27	27
All	54	43	26	18	3	21	8	5
42-S	-	-	-	-	-	-	-	-
42-M	-	-	-	-	-	-	-	-
42-L	100	200	107	95	12	107	12	0
All	100	200	107	95	12	107	12	0
E&T-S	0	22	12	17	6	23	-5	-11
E&T-M	61	73	40	30	6	36	10	4
E&T-L	60	123	66	48	4	52	18	14
All	50	75	40	32	5	37	8	3

1/ Weighted by total number of dunom
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 38. Estimated Production Costs and Returns for Barley by Resource Planning Unit, Farm Size and Euph. & Tributaries Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga- tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/ Value of Produc- tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
32-S	-	-	-	-	-	-	-	-
32-M	87	149	64	51	10	61	13	3
32-L	100	100	55	81	8	89	-26	-32
All	88	137	62	56	10	66	6	- 4
40-S	0	22	54	77	27	104	-23	-50
40-M	8	46	43	28	6	34	15	9
40-L	100	97	54	26	0	26	28	28
All	54	43	52	60	18	78	- 8	-26
42-S	-	-	-	-	-	-	-	-
42-M	-	-	-	-	-	-	-	-
42-L	100	200	54	48	6	54	6	0
All	100	200	54	48	6	54	6	0
E&T-S	0	22	54	77	27	104	-23	-50
E&T-M	61	73	54	40	8	48	14	6
E&T-L	60	123	54	39	3	22	35	32
All	50	75	54	57	16	73	- 3	-19

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 39. Estimated Production Costs and Returns for Barley by Resource Planning Unit, Farm Size and Northeast Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
38-S	0	88	53	37	5	42	16	11
38-M	0	85	46	30	0	30	16	16
38-L	0	94	54	30	3	33	24	21
All	0	88	51	33	3	36	18	15
41-S	0	68	36	7	38	45	29	-9
41-M	9	53	28	21	13	34	7	-6
41-L	0	25	12	8	0	8	4	4
All	6	50	26	15	15	30	11	-4
45-S	-	-	-	-	-	-	-	-
45-M	13	81	34	28	0	28	6	6
45-L	0	107	43	22	0	22	21	21
All	7	95	39	24	0	24	15	15
46-S	0	50	28	14	0	14	14	14
46-M	0	64	32	17	0	17	15	15
46-L	-	-	-	-	-	-	-	-
All	0	63	31	17	0	17	14	14
50-S	-	-	-	-	-	-	-	-
50-M	0	100	50	24	0	24	26	26
50-L	-	-	-	-	-	-	-	-
All	0	100	50	24	0	24	26	26
51-S	-	-	-	-	-	-	-	-
51-M	0	35	18	14	0	14	4	4
51-L	0	52	24	25	2	27	-1	-3
All	0	52	24	25	2	27	-1	-3
52-S	0	96	48	23	0	23	25	25
52-M	0	96	48	23	0	23	25	25
52-L	100	100	55	25	3	28	30	27
All	7	96	48	23	0	23	25	25
53-S	0	135	70	21	0	21	49	49
53-M	-	-	-	-	-	-	-	-
53-L	-	-	-	-	-	-	-	-
All	0	135	70	21	0	21	49	49
54-S	0	44	37	15	0	15	22	22
54-M	-	-	-	-	-	-	-	-
54-L	-	-	-	-	-	-	-	-
All	0	44	37	15	0	15	22	22
55	-	-	-	-	-	-	-	-
56	-	-	-	-	-	-	-	-

(Continued)

Appendix Table 39.(Cont) Estimated Production Costs and Returns for Barley by Resource Planning Unit, Farm Size and Northeast Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga- tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/ Value of Produc- tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
NE-S	0	79	47	26	4	30	21	17
NE-M	4	79	39	24	1	25	15	14
NE-L	10	69	32	25	2	27	7	5
All	2	75	38	25	2	27	13	11

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 40. Estimated Production Costs and Returns for Barley by Resource Planning Unit, Farm Size and Northeast Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per100 kg)1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
38-S	0	88	60	42	6	48	18	12
38-M	0	85	54	35	0	35	19	19
38-L	0	94	57	32	3	35	25	22
All	0	88	57	37	3	40	20	17
41-S	0	68	53	10	56	66	43	-13
41-M	9	53	53	40	24	64	13	-11
41-L	0	25	48	32	0	32	16	16
All	6	50	52	31	30	61	21	-9
45-S	-	-	-	-	-	-	-	-
45-M	13	81	42	35	0	35	7	7
45-L	0	107	40	21	0	21	19	19
All	7	95	41	26	0	26	15	15
46-S	0	50	56	28	0	28	28	28
46-M	0	64	50	27	0	27	23	23
46-L	-	-	-	-	-	-	-	-
All	0	63	50	27	0	27	23	23
50-S	-	-	-	-	-	-	-	-
50-M	0	100	50	24	0	24	26	26
50-L	-	-	-	-	-	-	-	-
All	0	100	50	24	0	24	26	26
51-S	-	-	-	-	-	-	-	-
51-M	0	35	51	40	0	40	11	11
51-L	0	52	46	48	4	52	-2	-6
All	0	52	46	48	4	52	-2	-6
52-S	0	96	50	24	0	24	26	26
52-M	0	96	50	24	0	24	26	26
52-L	100	100	55	25	3	28	30	27
All	7	96	50	24	0	24	26	26
53-S	0	135	52	16	0	16	36	36
53-M	-	-	-	-	-	-	-	-
53-L	-	-	-	-	-	-	-	-
All	0	135	52	16	0	16	36	36
54-S	0	44	84	34	0	34	50	50
54-M	-	-	-	-	-	-	-	-
54-L	-	-	-	-	-	-	-	-
All	0	44	84	34	0	34	50	50
55	-	-	-	-	-	-	-	-

(Continued)

Appendix Table 41. (Cont)Estimated Production Costs and Returns for Barley by Resource Planning Unit, Farm Size and Southwest Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga- tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/ Value of Produc- tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
All-S	6	32	31	19	19	38	12	- 7
All-M	32	68	38	26	16	42	12	- 4
All-L	0	33	20	19	8	27	1	- 7
All	15	50	33	22	16	38	11	- 5

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 42. Estimated Production Costs and Returns for Barley by Resource Planning Unit, Farm Size and Southwest Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per100 Kg)1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
2-S	0	22	56	41	32	73	15	-17
2-M	0	11	56	118	0	118	-62	-62
2-L	0	28	55	74	2	76	-19	-20
All	0	17	56	86	6	92	-30	-36
3-S	-	-	-	-	-	-	-	-
3-M	-	-	-	-	-	-	-	-
3-L	-	-	-	-	-	-	-	-
All	-	-	-	-	-	-	-	-
4-S	0	50	60	40	47	87	20	-27
4-M	0	43	51	52	35	87	- 1	-36
4-L	0	35	63	89	2	91	-26	-28
All	0	44	52	50	35	85	2	-33
5-S	0	59	58	44	55	99	14	-41
5-M	0	112	63	17	4	21	46	42
5-L	0	58	62	31	8	39	31	23
All	0	73	60	32	30	62	28	- 2
8-S	0	15	53	53	201	254	0	-201
8-M	0	8	50	100	212	312	-50	-262
8-L	0	19	53	47	134	181	6	-128
All	0	10	50	80	186	266	-30	-216
9-S	25	46	58	51	31	83	7	- 24
9-M	100	90	56	50	25	75	6	- 15
9-L	0	25	60	64	23	87	- 4	- 27
All	44	62	58	51	30	81	7	- 23
10-S	0	65	55	25	0	25	30	30
10-M	100	200	55	26	14	40	29	15
10-L	-	-	-	-	-	-	-	-
All	20	131	55	26	14	40	29	15
15-S	0	56	60	25	19	44	35	16
15-M	40	142	60	19	14	33	41	27
15-L	0	69	58	68	3	71	-10	-13
All	6	79	60	23	16	39	37	21
16-S	-	-	-	-	-	-	-	-
16-M	-	-	-	-	-	-	-	-
16-L	-	-	-	-	-	-	-	-
All	-	-	-	-	-	-	-	-

(Continued)

Appendix Table 42.(Cont)Estimated Production Costs and Returns for Barley by Resource Planning Unit, Farm Size and Southwest Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga- tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per100 Kg)1/ Value of Produc- tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
All-S	6	32	58	46	32	78	12	-20
All-M	32	68	56	39	24	63	17	- 7
All-L	0	33	60	56	20	76	4	-16
All	15	33	57	44	29	73	13	-16

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 43. Estimated Production Costs and Returns for Barley by Resource Planning Unit, Farm Size and Steppe Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga- tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/					
			Value of Produc- tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
1-S	0	67	42	17	17	34	25	8
1-M	0	42	26	26	4	30	0	- 4
1-L	-	-	-	-	-	-	-	-
All	0	42	26	26	4	30	0	- 4
13-S	9	66	37	18	20	38	19	- 1
13-M	53	37	21	27	15	42	- 6	-21
13-L	-	-	-	-	-	-	-	-
All	47	41	23	26	16	42	- 3	-19
17-S	39	9	5	13	3	16	- 8	-11
17-M	50	46	30	24	23	47	6	-17
17-L	50	141	78	32	36	72	46	12
All	44	56	34	24	23	47	10	-13
18-S	0	0	0	26	0	26	-26	-26
18-M	0	0	0	19	0	19	-19	-18
18-L	0	0	0	7	0	7	- 7	- 7
All	0	0	0	24	0	24	-24	-24
19-S	4	47	23	27	13	40	- 4	-17
19-M	26	36	20	20	16	36	0	-16
19-L	67	51	28	20	20	40	8	-12
All	13	40	21	22	15	37	- 1	-16
21-S	0	22	12	8	6	14	4	2
21-M	-	-	-	-	-	-	-	-
21-L	-	-	-	-	-	-	-	-
All	0	22	12	8	6	14	4	2
31-S	0	49	28	19	12	31	9	- 3
31-M	0	38	22	18	12	30	4	- 8
31-L	2	23	11	10	0	10	1	1
All	0	25	12	11	1	12	1	0
33	-	-	-	-	-	-	-	-
39-S	-	-	-	-	-	-	-	-
39-M	0	6	3	10	2	12	- 7	- 9
39-L	0	16	9	11	1	12	- 2	- 3
All	0	8	4	10	2	12	- 6	- 8
41-S	0	68	36	7	21	28	29	8
41-M	9	53	28	21	14	35	7	- 7
41-L	0	25	12	8	0	8	4	4
All	6	50	26	16	12	28	10	- 2

(Continued)

Appendix Table 43. (Cont)Estimated Production Costs and Returns for Barley by Resource Planning Unit, Farm Size and Steppe Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga- tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom)1/					
			Value of Produc- tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
ST-S	0	30	16	18	8	26	- 2	- 10
ST-M	24	29	16	19	11	30	- 3	- 14
ST-L	18	24	12	10	0	10	2	2
All	11	26	14	14	5	19	0	- 5

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 44. Estimated Production Costs and Returns for Barley by Resource Planning Unit, Farm Size and Steppe Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
1-S	0	67	63	25	25	50	38	13
1-M	0	42	62	62	10	72	0	-10
1-L	-	-	-	-	-	-	-	-
All	0	42	62	60	10	70	2	- 8
13-S	9	66	56	27	30	57	29	- 1
13-M	53	37	56	73	40	113	-17	-57
13-L	-	-	-	-	-	-	-	-
All	47	41	56	63	38	101	- 7	-55
17-S	39	9	56	33	177	-88		-121
17-M	50	46	65	52	50	102	13	- 37
17-L	50	141	55	23	26	49	32	6
All	44	56	61	43	40	83	18	- 22
18-S	0	0	0	0	0	0	0	0
18-M	0	0	0	0	0	0	0	0
18-L	0	0	0	0	0	0	0	0
All	0	0	0	0	0	0	0	0
19-S	4	47	49	57	28	85	- 8	-36
19-M	26	36	56	56	44	100	0	-44
19-L	67	51	55	39	39	78	16	-23
All	13	40	53	56	38	94	- 3	-41
21-S	0	22	55	36	27	63	19	- 8
21-M	-	-	-	-	-	-	-	-
21-L	-	-	-	-	-	-	-	-
All	0	22	55	36	27	63	19	- 8
31-S	0	49	57	39	24	63	18	- 6
31-M	0	38	58	47	32	79	11	-21
31-L	2	23	48	44	0	44	4	4
All	0	25	50	44	5	49	6	1
33	-	-	-	-	-	-	-	-
39-S	-	-	-	-	-	-	-	-
39-M	0	6	50	167	33	200	-117	-150
39-L	0	16	56	69	6	75	- 13	- 19
All	0	8	52	133	24	157	- 81	-133
41-S	0	68	53	10	31	41	43	12
41-M	9	53	53	40	26	66	13	- 13
41-L	0	25	48	32	0	32	16	16
All	6	50	52	31	25	56	21	- 4

(Continued)

Appendix Table 44.(Cont)Estimated Production Costs and Returns for Barley by Resource Planning Unit, Farm Size and Steppe Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga- tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per100 Kg)1/					
			Value of Produc- tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
ST-S	0	30	43	38	28	66	5	-23
ST-M	24	29	58	66	37	103	- 8	-45
ST-L	18	24	49	43	2	45	6	4
All	11	26	51	50	17	67	1	-16

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 45. Estimated Production Costs and Returns for Lentils by Resource Planning Unit, Farm Size and Mountain Type of Farming Region, Cropyear 1977-1978, S.A.R.

			Production Costs and Returns (S.L. Per Dunom) 1/					
RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
29-S	0	47	42	55	50	100	-13	-63
29-M	0	60	54	128	29	157	-74	-103
29-L	-	-	-	-	-	-	-	-
All	0	53	47	86	41	127	-39	- 80
30	-	-	-	-	-	-	-	-
36-S	0	62	50	47	36	83	3	- 33
36-M	0	65	58	47	5	52	11	6
36-L	-	-	-	-	-	-	-	-
All	0	62	51	47	32	79	4	- 28
37-S	-	-	-	-	-	-	-	-
37-M	0	42	34	33	15	48	1	- 14
37-L	-	-	-	-	-	-	-	-
All	0	42	34	33	15	48	1	- 14
58-S	0	60	51	16	45	61	35	- 10
58-M	-	-	-	-	-	-	-	-
58-L	-	-	-	-	-	-	-	-
All	0	60	51	16	45	61	35	- 10
MT-S	0	62	50	47	36	83	3	- 33
MT-M	0	63	56	49	7	56	7	0
MT-L	-	-	-	-	-	-	-	-
All	0	62	51	47	32	79	4	- 28

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 46. Estimated Production Costs and Returns for Lentils by Resource Planning Unit, Farm Size and Mountain Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
29-S	0	47	90	117	106	223	-27	-133
29-M	0	60	90	213	48	261	-123	-171
29-L	-	-	-	-	-	-	-	-
All	0	53	90	165	78	243	- 75	-153
30	-	-	-	-	-	-	-	-
36-S	0	62	80	75	58	133	5	- 53
36-M	0	65	90	72	8	80	18	10
36-L	-	-	-	-	-	-	-	-
All	0	62	81	75	51	126	6	- 45
37-S	-	-	-	-	-	-	-	-
37-M	0	42	80	79	36	115	1	- 35
37-L	-	-	-	-	-	-	-	-
All	0	42	80	79	36	115	1	- 35
58-S	0	60	85	27	75	102	58	- 17
58-M	-	-	-	-	-	-	-	-
58-L	-	-	-	-	-	-	-	-
All	0	60	85	27	75	102	58	- 17
MT-S	0	62	80	75	58	133	5	- 53
MT-M	0	63	89	78	11	89	11	0
MT-L	-	-	-	-	-	-	-	-
All	0	62	81	75	51	126	6	- 45

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 47. Estimated Production Costs and Returns for Lentils by Resource Planning Unit, Farm Size and Lowlands Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
26-S	0	58	46	42	6	48	4	- 2
26-M	0	56	48	37	0	37	11	11
26-L	-	-	-	-	-	-	-	-
All	0	58	47	39	3	42	8	5
34	-	-	-	-	-	-	-	-
35	-	-	-	-	-	-	-	-
47	-	-	-	-	-	-	-	-
L-S	0	58	46	42	6	48	4	- 2
L-M	0	56	48	37	0	37	11	11
L-L	-	-	-	-	-	-	-	-
All	0	58	47	39	3	42	8	5

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 48. Estimated Production Costs and Returns for Lentils by Resource Planning Unit, Farm Size and Lowlands Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
26-S	0	58	80	72	10	82	8	- 2
26-M	0	56	85	66	0	66	19	19
26-L	-	-	-	-	-	-	-	-
All	0	58	83	69	4	73	14	10
34	-	-	-	-	-	-	-	-
35	-	-	-	-	-	-	-	-
47	-	-	-	-	-	-	-	-
L-S	0	58	80	72	10	82	8	- 2
L-M	0	56	85	66	0	66	19	19
L-L	-	-	-	-	-	-	-	-
All	0	58	83	69	4	73	14	10

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 49. Estimated Production Costs and Returns for Lentils by Resource Planning Unit, Farm Size and Undulating Plains Type of Farming Region, Cropyear 1977-1978, S.A.R.

			Production Costs and Returns (S.L. Per Dunom) 1/					
RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
20	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-
25-S	0	59	50	25	13	38	25	12
25-M	-	-	-	-	-	-	-	-
25-L	-	-	-	-	-	-	-	-
All	0	59	50	25	13	38	25	12
27-S	0	84	71	70	34	104	1	-33
27-M	0	93	84	36	28	64	48	20
27-L	-	-	-	-	-	-	-	-
All	0	85	72	67	33	100	5	-28
38-S	0	90	76	54	0	54	22	22
38-M	0	91	77	59	8		18	10
38-L	-	-	-	-	-	-	-	-
All	0	91	77	58	6	64	19	13
48	-	-	-	-	-	-	-	-
49	-	-	-	-	-	-	-	-
57	-	-	-	-	-	-	-	-
UP-S	0	80	67	47	7	54	20	13
UP-M	0	91	77	59	8	67	18	10
UP-L	-	-	-	-	-	-	-	-
All	0	87	74	55	8	63	19	11

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 50. Estimated Production Costs and Returns for Lentils by Resource Planning Unit, Farm Size and Undulating Plains Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga- tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per100 Kg)1/					
			Value of Produc- tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
20	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-
25-S	0	59	85	42	22	64	43	21
25-M	-	-	-	-	-	-	-	-
25-L	-	-	-	-	-	-	-	-
All	0	59	85	42	22	64	43	21
27-S	0	84	85	83	40	123	2	-38
27-M	0	93	90	39	30	69	51	21
27-L	-	-	-	-	-	-	-	-
All	0	85	85	79	39	118	6	-33
38-S	0	90	85	60	0	60	25	25
38-M	0	91	85	65	9	74	20	11
38-L	-	-	-	-	-	-	-	-
All	0	91	85	64	7	71	21	14
48	-	-	-	-	-	-	-	-
49	-	-	-	-	-	-	-	-
57	-	-	-	-	-	-	-	-
UP-S	0	80	85	58	9	67	27	18
UP-M	0	91	85	65	9	74	20	11
UP-L	-	-	-	-	-	-	-	-
All	0	87	85	63	9	72	22	13

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 51. **Estimated Production Costs and Returns for Lentils by Resource Planning Unit, Farm Size and Euph. & Tributaries Type of Farming Region, Cropyear 1977-1978, S.A.R.**

RPU and Farm Size	Extent of Irriga-tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/ Value of Produc-tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
32-S	100	115	98	107	34	141	-9	-43
32-M	100	93	79	55	43	98	24	-19
32-L	-	-	-	-	-	-	-	-
All	100	103	87	77	39	70	10	-25
40	-	-	-	-	-	-	-	-
42	-	-	-	-	-	-	-	-
E&T-S	100	115	98	107	34	141	- 9	-43
E&T-M	100	93	79	55	43	88	24	-19
E&T-L	-	-	-	-	-	-	-	-
All	100	103	87	77	39	116	10	-29

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 52. Estimated Production Costs and Returns for Lentils by Resource Planning Unit, Farm Size and Euph. & Tributaries Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga-tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/ Value of Produc-tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
32-S	100	115	85	93	30	123	-8	-38
32-M	100	93	85	59	46	105	26	-20
32-L	-	-	-	-	-	-	-	-
All	100	103	85	76	38	114	9	-29
40	-	-	-	-	-	-	-	-
42	-	-	-	-	-	-	-	-
E&T-S	100	115	85	93	30	123	-8	-38
E&T-M	100	93	85	59	46	105	26	-20
E&T-L	-	-	-	-	-	-	-	-
All	100	103	85	76	38	114	9	-29

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 53. **Estimated Production Costs and Returns for Lentils by Resource Planning Unit, Farm Size and Northeast Type of Farming Region, Cropyear 1977-1978, S.A.R.**

			Production Costs and Returns (S.L. Per Dunom) 1/					
RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
38-S	0	90	76	54	0	54	22	22
38-M	0	91	77	59	8	67	18	10
38-L	-	-	-	-	-	-	-	-
All	0	91	77	58	6	64	19	13
41	-	-	-	-	-	-	-	-
45	-	-	-	-	-	-	-	-
46	-	-	-	-	-	-	-	-
50	-	-	-	-	-	-	-	-
51	-	-	-	-	-	-	-	-
52-S	-	-	-	-	-	-	-	-
52-M	-	-	-	-	-	-	-	-
52-L	100	120	108	52	12	64	56	44
All	100	120	108	52	12	64	56	44
53	-	-	-	-	-	-	-	-
54-S	0	82	70	86	3	89	-16	-19
54-M	-	-	-	-	-	-	-	-
54-L	-	-	-	-	-	-	-	-
All	0	82	70	86	3	89	-16	-19
55	-	-	-	-	-	-	-	-
56	-	-	-	-	-	-	-	-
NE-S	0	85	72	74	2	76	- 2	- 4
NE-M	0	91	77	59	8	67	18	10
NE-L	100	120	108	52	28	79	56	28
All	3	90	76	65	6	71	11	5

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 54. Estimated Production Costs and Returns for Lentils by Resource Planning Unit, Farm Size and Northeast Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/: Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
38-S	0	90	85	60	0	60	25	25
38-M	0	91	85	65	9	74	20	11
38-L	-	-	-	-	-	-	-	-
All	0	91	85	64	7	71	21	14
41	-	-	-	-	-	-	-	-
45	-	-	-	-	-	-	-	-
46	-	-	-	-	-	-	-	-
50	-	-	-	-	-	-	-	-
51	-	-	-	-	-	-	-	-
52-S	-	-	-	-	-	-	-	-
52-M	-	-	-	-	-	-	-	-
52-L	100	120	90	43	10	53	47	37
All	100	120	90	43	10	53	47	37
53	-	-	-	-	-	-	-	-
54-S	0	82	85	105	4	109	-20	-24
54-M	-	-	-	-	-	-	-	-
54-L	-	-	-	-	-	-	-	-
All	0	82	85	105	4	109	-20	-24
55	-	-	-	-	-	-	-	-
NE-S	0	85	85	87	2	89	- 2	- 4
NE-M	0	91	85	65	9	74	20	11
NE-L	100	120	90	43	23	66	47	24
All	3	90	85	73	6	79	12	6

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 55. **Estimated Production Costs and Returns for** Lentils **by Resource Planning Unit, Farm Size and** Southwest **Type of Farming Region, Cropyear 1977-1978, S.A.R.**

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/: Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
2-S	0	19	16	12	10	22	4	- 6
2-M	0	15	13	25	0	25	-12	-12
2-L	-	-	-	-	-	-	-	-
All	0	17	14	19	4	23	- 5	- 9
3	-	-	-	-	-	-	-	-
4-S	0	44	37	23	13	36	14	1
4-M	0	31	26	28	4	32	- 2	- 6
4-L	-	-	-	-	-	-	-	-
All	0	37	30	26	8	34	4	- 4
5-S	0	40	34	17	20	37	17	- 3
5-M	-	-	-	-	-	-	-	-
5-L	-	-	-	-	-	-	-	-
All	0	40	34	17	20	37	17	- 3
8	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-
15	-	-	-	-	-	-	-	-
16	-	-	-	-	-	-	-	-
SW-S	0	28	24	15	12	27	9	- 3
SW-M	0	20	17	26	1	27	- 9	-10
SW-L	-	-	-	-	-	-	-	-
All	0	24	20	21	6	27	- 1	- 7

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 56. Estimated Production Costs and Returns for Lentils by Resource Planning Unit, Farm Size and Southwest Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
2-S	0	19	85	63	52	115	22	-30
2-M	0	15	85	167	0	167	-82	-82
2-L	-	-	-	-	-	-	-	-
All	0	17	85	115	26	141	-30	-56
3	-	-	-	-	-	-	-	-
4-S	0	44	85	52	29	81	33	4
4-M	0	31	85	90	13	103	- 5	-18
4-L	-	-	-	-	-	-	-	-
All	0	37	85	70	21	91	15	- 6
5-S	0	40	85	42	50	92	43	- 7
5-M	-	-	-	-	-	-	-	-
5-L	-	-	-	-	-	-	-	-
All	0	40	85	42	50	92	43	- 7
8	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-
15	-	-	-	-	-	-	-	-
16	-	-	-	-	-	-	-	-
SW-S	0	28	85	54	44	98	31	-13
SW-M	0	20	85	131	6	76	-46	-52
SW-L	-	-	-	-	-	-	-	-
All	0	24	85	87	28	115	- 2	-30

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 57. Estimated Production Costs and Returns for Lentils by Resource Planning Unit, Farm Size and Steppe Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
1	-	-	-	-	-	-	-	-
13-S	-	-	-	-	-	-	-	-
13-M	0	30	26	45	8	53	-15	-27
13-L	-	-	-	-	-	-	-	-
All	0	30	26	45	8	53	-15	-27
17	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-
19-S	100	160	136	189	56	245	-53	-109
19-M	-	-	-	-	-	-	-	-
19-L	-	-	-	-	-	-	-	-
All	100	160	136	189	56	245	-53	-109
21	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-
33	-	-	-	-	-	-	-	-
39	-	-	-	-	-	-	-	-
41	-	-	-	-	-	-	-	-
ST-S	100	160	136	189	56	245	-53	-109
ST-M	0	30	26	45	8	53	-15	- 27
ST-L	-	-	-	-	-	-	-	-
All	3	50	43	68	15	83	-25	- 40

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 58. Estimated Production Costs and Returns for Lentils by Resource Planning Unit, Farm Size and Steppe Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/: Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
1	-	-	-	-	-	-	-	-
13-S	-	-	-	-	-	-	-	-
13-M	0	30	85	150	26	176	-65	-91
13-L	-	-	-	-	-	-	-	-
All	0	30	85	150	26	176	-65	-91
17	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-
19-S	100	160	85	118	35	153	-33	-68
19-M	-	-	-	-	-	-	-	-
19-L	-	-	-	-	-	-	-	-
All	100	160	85	118	35	153	-33	-68
21	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-
33	-	-	-	-	-	-	-	-
39	-	-	-	-	-	-	-	-
41	-	-	-	-	-	-	-	-
ST-S	100	160	85	118	35	153	-33	-68
ST-M	0	30	85	150	26	176	-65	-91
ST-L	-	-	-	-	-	-	-	-
All	3	50	85	134	30	164	-49	-79

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 59. Estimated Production Costs and Returns for Chickpeas by Resource Planning Unit, Farm Size and Mountain Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
29	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-
36-S	0	86	188	92	16	108	96	80
36-M	0	46	79	53	2	55	26	24
36-L	0	32	82	40	2	42	42	40
All	0	36	89	44	3	47	45	42
37	-	-	-	-	-	-	-	-
58	-	-	-	-	-	-	-	-
MT-S	0	86	188	92	16	108	96	80
MT-M	0	46	79	53	2	55	26	24
MT-L	0	32	82	40	2	42	42	40
All	0	36	89	44	3	47	45	42

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unapid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 60. Estimated Production Costs and Returns for Chickpeas by Resource Planning Unit, Farm Size and Mountain Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per100 Kg) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
29	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-
36-S	0	86	219	107	19	126	112	93
36-M	0	46	172	115	4	119	57	53
36-L	0	32	256	125	6	131	131	125
All	0	36	249	122	8	130	127	119
37	-	-	-	-	-	-	-	-
58	-	-	-	-	-	-	-	-
MT-S	0	86	219	107	19	126	112	93
MT-M	0	46	172	115	4	119	57	53
MT-L	0	32	256	125	6	131	131	125
All	0	36	249	122	8	130	127	119

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 61. Estimated Production Costs and Returns for Chickpeas by Resource Planning Unit, Farm Size and Lowlands Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
26-S	0	30	75	25	8	33	50	42
26-M	0	50	100	48	0	48	52	52
26-L	-	-	-	-	-	-	-	-
All	0	44	92	41	4	45	51	47
34	-	-	-	-	-	-	-	-
35	-	-	-	-	-	-	-	-
47	-	-	-	-	-	-	-	-
L-S	0	30	75	25	8	33	50	42
L-M	0	50	100	48	0	48	52	52
L-L	-	-	-	-	-	-	-	-
All	0	44	92	41	4	45	51	47

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 62. Estimated Production Costs and Returns for Chickpeas by Resource Planning Unit, Farm Size and Lowlands Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
26-S	0	30	250	83	27	110	167	140
26-M	0	50	200	96	0	96	104	104
26-L	-	-	-	-	-	-	-	-
All	0	44	211	93	6	99	118	112
34	-	-	-	-	-	-	-	-
35	-	-	-	-	-	-	-	-
47	-	-	-	-	-	-	-	-
L-S	0	30	250	83	27	110	167	140
L-M	0	50	200	96	0	96	104	104
L-L	-	-	-	-	-	-	-	-
All	0	44	211	93	6	99	118	112

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 63. Estimated Production Costs and Returns for Chickpeas by Resource Planning Unit, Farm Size and Southwest Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/: Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
2	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-
4-S	0	36	90	36	27	63	54	27
4-M	0	14	35	35	6	41	0	-6
4-L	0	39	112	43	2	45	69	67
All	0	23	61	37	7	44	24	17
5-S	0	79	281	95	7	102	186	179
5-M	0	68	244	62	12	74	182	170
5-L	0	75	224	39	7	46	185	178
All	0	75	262	77	8	64	185	177
8	-	-	-	-	-	-	-	-
9-S	0	222	554	36	58	94	518	460
9-M	-	-	-	-	-	-	-	-
9-L	-	-	-	-	-	-	-	-
All	0	222	554	36	58	94	518	460
10	-	-	-	-	-	-	-	-
15-S	0	63	159	44	26	70	115	89
15-M	0	79	241	51	20	71	190	170
15-L	0	122	300	61	12	73	239	227
All	0	78	213	50	23	73	163	140
16	-	-	-	-	-	-	-	-
SW-S	0	83	268	64	15	79	202	187
SW-M	0	54	175	50	12	62	125	113
SW-L	0	73	207	43	7	50	164	157
All	0	71	225	56	13	69	169	156

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 64. Estimated Production Costs and Returns for Chickpeas by Resource Planning Unit, Farm Size and Southwest Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per100 Kg)1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
2	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-
4-S	0	36	250	100	74	174	150	50
4-M	0	14	250	250	43	293	0	-43
4-L	0	39	287	110	4	114	177	173
All	0	23	262	161	30	191	101	71
5-S	0	79	356	120	9	129	236	227
5-M	0	68	359	91	18	109	268	250
5-L	0	75	299	52	9	61	247	238
All	0	75	349	75	11	86	274	263
8	-	-	-	-	-	-	-	-
9-S	0	222	250	16	26	42	234	208
9-M	-	-	-	-	-	-	-	-
9-L	-	-	-	-	-	-	-	-
All	0	222	250	16	26	42	234	208
10	-	-	-	-	-	-	-	-
15-S	0	63	353	70	41	111	283	242
15-M	0	79	305	65	26	91	240	214
15-L	0	122	246	50	10	60	196	186
All	0	78	273	64	29	93	209	180
16	-	-	-	-	-	-	-	-
SW-S	0	83	335	77	18	95	258	240
SW-M	0	54	324	93	23	116	231	208
SW-L	0	73	284	59	9	68	225	216
All	0	71	335	79	18	97	256	238

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 65. Estimated Production Costs and Returns for Cotton by Resource Planning Unit, Farm Size and Lowlands Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
26-S	-	-	-	-	-	-	-	-
26-M	100	120	197	115	14	129	82	68
26-L	100	114	176	142	5	147	34	29
All	100	118	189	125	11	136	64	53
34-S	-	-	-	-	-	-	-	-
34-M	100	150	243	193	61	254	50	-11
34-L	50	256	420	543	7	550	-123	-130
All	98	158	256	219	57	276	37	- 20
35	-	-	-	-	-	-	-	-
47	-	-	-	-	-	-	-	-
L-S	-	-	-	-	-	-	-	-
L-M	100	144	234	177	52	229	57	5
L-L	83	163	261	282	6	288	-21	-27
All	99	147	238	193	45	238	45	0

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 66. Estimated Production Costs and Returns for Cotton by Resource Planning Unit, Farm Size and Lowlands Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per100 Kg)1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
26-S	-	-	-	-	-	-	-	-
26-M	100	120	164	96	12	108	68	56
26-L	100	114	154	125	4	129	29	25
All	100	118	160	106	9	115	54	45
34-S	-	-	-	-	-	-	-	-
34-M	100	150	162	129	41	170	33	- 8
34-L	50	256	164	212	3	215	-48	-51
All	98	158	162	139	36	175	23	-13
35	-	-	-	-	-	-	-	-
47	-	-	-	-	-	-	-	-
L-S	-	-	-	-	-	-	-	-
L-M	100	144	162	123	36	159	39	3
L-L	83	163	159	173	3	176	-14	-17
All	99	147	162	132	30	162	30	0

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 67. Estimated Production Costs and Returns for Cotton by Resource Planning Unit, Farm Size and Undulating Plains Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga- tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/ Value of Produc- tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
20-S	-	-	-	-	-	-	-	-
20-M	100	253	412	241	22	263	171	149
20-L	-	-	-	-	-	-	-	-
All	100	253	412	241	22	263	171	149
23	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-
38	-	-	-	-	-	-	-	-
48	-	-	-	-	-	-	-	-
49-S	-	-	-	-	-	-	-	-
49-M	-	-	-	-	-	-	-	-
49-L	100	167	275	86	49	135	189	140
All	100	167	275	86	49	135	189	140
57-S	-	-	-	-	-	-	-	-
57-M	100	137	171	80	34	114	91	57
57-L	-	-	-	-	-	-	-	-
All	100	137	171	80	34	114	91	57
UP-S	-	-	-	-	-	-	-	-
UP-M	100	250	406	237	22	259	169	147
UP-L	100	167	275	86	49	135	189	140
All	100	246	400	230	23	253	170	147

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 68. Estimated Production Costs and Returns for Cotton by Resource Planning Unit, Farm Size and Undulating Plains Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga-tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/					
			Value of Produc-tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
20-S	-	-	-	-	-	-	-	-
20-M	100	253	163	95	9	104	68	59
20-L	-	-	-	-	-	-	-	-
All	100	253	163	95	9	104	68	59
23	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-
38	-	-	-	-	-	-	-	-
48	-	-	-	-	-	-	-	-
49-S	-	-	-	-	-	-	-	-
49-M	-	-	-	-	-	-	-	-
49-L	100	167	164	52	29	81	112	83
All	100	167	164	52	29	81	112	83
57-S	-	-	-	-	-	-	-	-
57-M	100	137	125	58	25	83	67	42
57-L	-	-	-	-	-	-	-	-
All	100	137	125	58	25	83	67	42
UP-S	-	-	-	-	-	-	-	-
UP-M	100	250	162	94	9	103	68	59
UP-L	100	167	164	52	29	81	112	83
All	100	246	162	93	10	103	69	59

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 69. Estimated Production Costs and Returns for Cotton by Resource Planning Unit, Farm Size and Euph. & Tributaries Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
32-S	100	272	417	194	71	265	346	152
32-M	100	228	362	150	35	185	212	177
32-L	100	481	750	198	31	229	552	521
All	100	266	418	162	40	202	256	216
40-S	100	290	478	104	196	300	374	178
40-M	100	273	446	170	164	334	276	112
40-L	100	300	375	172	76	248	203	127
All	100	280	453	149	170	319	304	134
42-S	100	163	287	152	46	198	135	89
42-M	-	-	-	-	-	-	-	-
42-L	100	256	372	158	39	197	214	175
All	100	255	371	158	39	197	213	174
E&T-S	100	273	427	174	97	271	253	156
E&T-M	100	233	370	153	48	201	217	169
E&T-L	100	320	478	169	37	206	309	272
All	100	265	411	161	51	212	250	199

1/ Weighted by total number of dunom
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 70. Estimated Production Costs and Returns for Cotton by Resource Planning Unit, Farm Size and Euph. & Tributaries Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
32-S	100	272	153	71	26	97	82	56
32-M	100	228	159	66	15	81	93	78
32-L	100	481	156	41	6	47	115	109
All	100	266	157	61	15	76	96	81
40-S	100	290	165	36	68	104	129	61
40-M	100	273	163	62	60	122	101	41
40-L	100	300	125	57	25	82	68	43
All	100	280	162	53	61	114	109	48
42-S	100	163	176	93	28	121	83	55
42-M	-	-	-	-	-	-	-	-
42-L	100	256	145	62	15	77	83	68
All	100	255	145	62	15	77	83	68
E&T-S	100	273	156	63	36	99	93	57
E&T-M	100	233	159	66	20	86	93	73
E&T-L	100	320	149	53	11	64	96	85
All	100	265	155	61	19	80	94	75

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 71. Estimated Production Costs and Returns for Cotton by Resource Planning Unit, Farm Size and Northeast Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga- tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/ Value of Produc- tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
38	-	-	-	-	-	-	-	-
41-S	100	242	340	126	119	245	214	95
41-M	100	235	373	118	133	251	255	122
41-L	-	-	-	-	-	-	-	-
All	100	237	365	120	129	369	245	116
45-S	-	-	-	-	-	-	-	-
45-M	100	321	445	78	173	251	367	194
45-L	100	294	411	71	119	190	340	221
All	100	294	413	71	122	193	342	220
46-S	100	164	271	93	69	162	178	109
46-M	100	256	415	39	126	165	376	250
46-L	-	-	-	-	-	-	-	-
All	100	234	379	52	112	164	327	215
50	-	-	-	-	-	-	-	-
51-S	100	167	314	155	64	219	159	95
51-M	100	197	256	94	84	178	162	78
51-L	100	239	326	145	37	182	181	144
All	100	210	298	125	61	186	173	112
52-S	-	-	-	-	-	-	-	-
52-M	-	-	-	-	-	-	-	-
52-L	100	295	447	240	32	272	207	175
All	100	295	447	240	32	272	207	175
53-S	100	292	438	163	14	177	275	261
53-M	100	291	437	238	55	293	199	144
53-L	100	200	300	187	94	281	113	19
All	100	264	396	220	65	285	176	111
54	-	-	-	-	-	-	-	-
55	-	-	-	-	-	-	-	-
56	-	-	-	-	-	-	-	-

(Continued)

Appendix Table 71. (Cont)Estimated Production Costs and Returns for Cotton by Resource Planning Unit, Farm Size and Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. PerDunom) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
NE-S	100	236	343	131	105	236	212	107
NE-M	100	253	388	153	106	259	235	129
NE-L	100	153	407	163	84	247	244	160
All	100	204	392	156	96	252	236	140

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 72. Estimated Production Costs and Returns for Cotton by Resource Planning Unit, Farm Size and Northeast Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga- tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per100 Kg)1/ Value of Produc- tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
38	-	-	-	-	-	-	-	-
41-S	100	242	140	52	49	101	88	39
41-M	100	235	159	50	57	107	109	52
41-L	-	-	-	-	-	-	-	-
All	100	237	154	50	55	105	104	49
45-S	-	-	-	-	-	-	-	-
45-M	100	321	139	24	54	78	110	61
45-L	100	294	140	24	40	64	116	76
All	100	294	140	24	41	65	116	75
46-S	100	164	165	57	42	99	108	66
46-M	100	256	162	15	49	64	147	98
46-L	-	-	-	-	-	-	-	-
All	100	234	163	27	46	73	136	90
50	-	-	-	-	-	-	-	-
51-S	100	167	188	93	38	131	95	57
51-M	100	197	130	48	43	91	82	39
51-L	100	239	136	61	16	77	75	59
All	100	210	140	60	30	90	80	50
52-S	-	-	-	-	-	-	-	-
52-M	-	-	-	-	-	-	-	-
52-L	100	295	152	81	11	92	71	60
All	100	295	152	81	11	92	71	60
53-S	100	292	150	56	5	61	94	89
53-M	100	291	150	82	19	101	68	49
53-L	100	200	150	94	47	141	56	9
All	100	264	150	84	25	109	66	41
54	-	-	-	-	-	-	-	-
55	-	-	-	-	-	-	-	-

(Continued)

Appendix Table 72. (Cont) Estimated Production Costs and Returns for Cotton by Resource Planning Unit, Farm Size and Northeast Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irriga- tion 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/					
			Value of Produc- tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
NE-S	100	236	145	56	44	100	89	45
NE-M	100	253	154	60	42	102	94	52
NE-L	100	153	146	58	26	84	88	62
All	100	204	149	59	34	93	90	56

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 73. Estimated Production Costs and Returns for Cotton by Resource Planning Unit, Farm Size and Southwest Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
2	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-
10-S	100	332	565	196	209	405	369	160
10-M	100	200	340	168	77	245	172	95
10-L	100	324	523	184	47	231	339	292
All	100	260	432	177	82	259	255	173
15	-	-	-	-	-	-	-	-
16	-	-	-	-	-	-	-	-
SW-S	100	332	565	196	209	405	369	160
SW-M	100	200	340	168	77	245	172	95
SW-L	100	324	523	184	47	231	339	292
All	100	260	432	177	82	259	255	173

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 74. Estimated Production Costs and Returns for Cotton by Resource Planning Unit, Farm Size and Southwest Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
2	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-
10-S	100	332	170	59	63	122	111	48
10-M	100	200	170	84	38	122	86	48
10-L	100	324	161	57	14	71	104	90
All	100	260	166	68	31	99	98	67
15	-	-	-	-	-	-	-	-
16	-	-	-	-	-	-	-	-
SW-S	100	332	170	59	63	122	111	48
SW-M	100	200	170	84	38	122	86	48
SW-L	100	324	161	57	14	71	104	90
All	100	260	166	68	31	99	98	67

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 75. Estimated Production Costs and Returns for Cotton by Resource Planning Unit, Farm Size and Steppe Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
1	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-
19-S	100	174	305	196	34	230	109	75
19-M	100	231	413	259	31	290	154	123
19-L	-	-	-	-	-	-	-	-
All	100	211	375	237	32	269	138	106
31-S	100	147	246	111	33	144	135	102
31-M	100	196	317	149	18	167	168	150
31-L	100	298	489	116	60	176	373	313
All	100	194	318	128	31	159	190	159
33	-	-	-	-	-	-	-	-
39	-	-	-	-	-	-	-	-
41-S	100	242	340	126	87	213	214	127
41-M	100	235	372	118	98	216	254	156
41-L	-	-	-	-	-	-	-	-
All	100	237	364	120	95	215	244	149
ST-S	100	188	287	119	56	175	168	112
ST-M	100	223	397	130	72	202	267	195
ST-L	100	298	489	116	60	176	373	313
All	100	218	329	125	66	191	204	138

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 76. Estimated Production Costs and Returns for Cotton by Resource Planning Unit, Farm Size and Steppe Type of Farming Region, Cropyear 1977-1978, S.A.R.

			Production Costs and Returns (S.L. Per100 Kg)1/					
RPU and Farm Size	Extent of Irriga-tion 2/ (Pct.)	Yield (Kg)/ Dunom	Value of Produc-tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
1	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-
19-S	100	174	175	113	20	133	62	42
19-M	100	231	179	112	13	125	67	54
19-L	-	-	-	-	-	-	-	-
All	100	211	178	112	15	127	66	51
31-S	100	147	167	76	22	98	91	69
31-M	100	196	162	76	9	85	86	77
31-L	100	298	164	39	20	59	125	105
All	100	194	164	66	16	82	98	82
33	-	-	-	-	-	-	-	-
39	-	-	-	-	-	-	-	-
41-S	100	242	140	52	36	88	88	52
41-M	100	235	158	50	42	92	108	66
41-L	-	-	-	-	-	-	-	-
All	100	237	153	50	40	90	103	63
ST-S	100	188	152	64	30	94	88	58
ST-M	100	223	160	58	32	90	102	70
ST-L	100	198	164	39	20	59	125	105
All	100	218	158	58	30	88	100	70

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 77. **Estimated Production Costs** and **Returns** for Sugar Beets by **Resource Planning Unit, Farm Size** and Lowlands Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
26	-	-	-	-	-	-	-	-
34-S	100	3750	488	1156	163	1319	-668	-831
34-M	100	2612	297	214	116	330	83	- 33
34-L	100	994	211	487	0	487	-276	-276
All	100	2548	298	264	110	374	34	- 76
35	-	-	-	-	-	-	-	-
47	-	-	-	-	-	-	-	-
L-S	100	3750	488	1156	163	1319	-668	-831
L-M	100	2612	297	214	116	330	83	- 33
L-L	100	994	211	487	0	487	-276	-276
All	100	2548	298	264	110	374	34	- 76

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 78. Estimated Production Costs and Returns for Sugar Beets by Resource Planning Unit, Farm Size and Lowlands Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/: Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
26	-	-	-	-	-	-	-	-
34-S	100	3750	13	31	4	35	-18	-22
34-M	100	2612	11	8	4	12	3	- 1
34-L	100	994	21	49	0	49	-28	-28
All	100	2548	11	10	4	14	1	- 3
35	-	-	-	-	-	-	-	-
47	-	-	-	-	-	-	-	-
L-S	100	3750	13	31	4	35	-18	-22
L-M	100	2612	11	8	4	12	3	- 1
L-L	100	994	21	49	0	49	-28	-28
All	100	2548	11	10	4	14	1	- 3

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 79. Estimated Production Costs and Returns for Sugar Beets by Resource Planning Unit, Farm Size and Euph. & Tributaries Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
32-S	-	-	-	-	-	-	-	-
32-M	100	2000	260	146	150	296	114	-36
32-L	100	600	84	185	50	235	-101	-151
All	100	1938	252	148	146	294	104	- 42
40	-	-	-	-	-	-	-	-
42	-	-	-	-	-	-	-	-
E&T-S	-	-	-	-	-	-	-	-
E&T-M	100	2000	260	146	150	296	114	-36
E&T-L	100	600	84	185	50	235	-101	-151
All	100	1938	252	148	146	294	104	- 42

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 80. Estimated Production Costs and Returns for Sugar Beets by Resource Planning Unit, Farm Size and Euph. & Tributaries Type of Farming Region, Cropyear 1977-1978, S.A.R.

			Production Costs and Returns (S.L. Per100 Kg)1/					
RPU and Farm Size	Extent of Irriga- tion 2/ (Pct.)	Yield (Kg)/ Dunom	Value of Produc- tion	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
32-S	-	-	-	-	-	-	-	-
32-M	100	2000	13	7	87	15	6	-2
32-L	100	600	14	31	8	39	-17	-25
All	100	1938	13	7	8	15	6	-2
40	-	-	-	-	-	-	-	-
42	-	-	-	-	-	-	-	-
E&T-S	-	-	-	-	-	-	-	-
E&T-M	100	2000	12	7	8	15	5	-3
E&T-L	100	600	14	31	8	39	-17	-25
All	100	1938	13	7	8	15	6	- 2

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 81. Estimated Production Costs and Returns for Sugar Beets by Resource Planning Unit, Farm Size and Steppe Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
1	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-
31-S	-	-	-	-	-	-	-	-
31-M	-	-	-	-	-	-	-	-
31-L	100	2000	240	240	0	2	0	0
All	100	2000	240	240	0	2	0	0
33	-	-	-	-	-	-	-	-
39	-	-	-	-	-	-	-	-
41	-	-	-	-	-	-	-	-
ST-S	-	-	-	-	-	-	-	-
ST-M	-	-	-	-	-	-	-	-
ST-L	100	2000	240	240	0	240	0	0
All	100	2000	240	240	0	240	0	0

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 82. Estimated Production Costs and Returns for Sugar Beets by Resource Planning Unit, Farm Size and Steppe Type of Farming Region, Cropyear 1977-1978, S.A.R.

			Production Costs and Returns (S.L. Per100 Kg)1/					
RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
1	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-
31-S	-	-	-	-	-	-	-	-
31-M	-	-	-	-	-	-	-	-
31-L	100	2000	12	12	0	12	0	0
All	100	2000	12	12	0	12	0	0
33	-	-	-	-	-	-	-	-
39	-	-	-	-	-	-	-	-
41	-	-	-	-	-	-	-	-
ST-S	-	-	-	-	-	-	-	-
ST-M	-	-	-	-	-	-	-	-
ST-L	100	2000	12	7	0	7	5	5
All	100	2000	12	7	0	7	5	5

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 83. Estimated Production Costs and Returns for Tobacco by Resource Planning Unit, Farm Size and Coastal Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
28-S	-	-	-	-	-	-	-	-
28-M	100	217	1302	254	809	1063	1048	239
28-L	-	-	-	-	-	-	-	-
All	100	217	1302	254	809	1063	1048	239
C-S	-	-	-	-	-	-	-	-
C-M	100	217	1302	254	809	1063	1048	239
C-L	-	-	-	-	-	-		
All	100	217	1302	254	809	1063	1048	239

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 84. Estimated Production Costs and Returns for Tobacco by Resource Planning Unit, Farm Size and Coastal Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per100 Kg)1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
28-S	-	-	-	-	-	-	-	-
28-M	100	217	600	117	373	490	483	110
28-L	-	-	-	-	-	-	-	-
All	100	217	600	117	373	490	483	110
C-S	-	-	-	-	-	-	-	-
C-M	100	217	600	117	373	490	483	110
C-L	-	-	-	-	-	-	-	-
All	100	217	600	117	373	490	483	110

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 85. Estimated Production Costs and Returns for Tobacco by Resource Planning Unit, Farm Size and Mountain Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/: Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
29	-	-	-	-	-	-	-	-
30-S	6	64	446	126	262	388	320	58
30-M	35	69	368	125	165	290	243	78
30-L	-	-	-	-	-	-	-	-
All	8	65	434	126	248	374	308	60
36-S	0	37	250	95	124	219	155	31
36-M	75	126	753	287	184	471	466	282
36-L	-	-	-	-	-	-	-	-
All	21	66	414	157	144	301	257	113
37	-	-	-	-	-	-	-	-
58-S	0	77	539	42	320	362	497	177
58-M	0	25	176	64	120	184	112	- 8
58-L	-	-	-	-	-	-	-	-
All	0	47	331	54	206	260	277	71
MT-S	4	57	398	118	228	346	280	52
MT-M	48	94	539	198	172	370	341	169
MT-L	-	-	-	-	-	-	-	-
All	10	65	427	134	216	350	293	77

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 86. Estimated Production Costs and Returns for Tobacco by Resource Planning Unit, Farm Size and Mountain Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
29	-	-	-	-	-	-	-	-
30-S	6	64	697	197	409	606	500	91
30-M	35	69	533	181	239	420	352	113
30-L	-	-	-	-	-	-	-	-
All	8	65	671	194	382	576	477	95
36-S	0	37	675	257	335	592	418	83
36-M	75	126	598	228	146	374	370	224
36-L	-	-	-	-	-	-	-	-
All	21	66	627	239	218	457	388	170
37	-	-	-	-	-	-	-	-
58-S	0	77	700	54	415	469	646	231
58-M	0	25	704	256	480	736	448	- 32
58-L	-	-	-	-	-	-	-	-
All	0	47	701	115	434	549	586	152
MT-S	4	57	694	205	397	602	485	92
MT-M	48	94	575	211	183	394	364	181
MT-L	-	-	-	-	-	-	-	-
All	10	65	659	207	334	541	452	118

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 87. Estimated Production Costs and Returns for Tobacco by Resource Planning Unit, Farm Size and Lowlands Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
26	-	-	-	-	-	-	-	-
34	-	-	-	-	-	-	-	-
35-S	33	99	546	132	326	458	414	88
53-M	-	-	-	-	-	-	-	-
35-L	-	-	-	-	-	-	-	-
All	33	99	546	132	326	458	414	88
47	-	-	-	-	-	-	-	-
L-S	33	99	546	132	326	458	414	88
L-M	-	-	-	-	-	-	-	-
L-L	-	-	-	-	-	-	-	-
All	33	99	546	132	326	458	414	88

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 88. Estimated Production Costs and Returns for Tobacco by Resource Planning Unit, Farm Size and Lowlands Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/ Value of Production					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
26	-	-	-	-	-	-	-	-
34	-	-	-	-	-	-	-	-
35-S	33	99	552	133	329	462	419	90
35-M	-	-	-	-	-	-	-	-
35-L	-	-	-	-	-	-	-	-
All	33	99	552	133	329	462	419	90
47	-	-	-	-	-	-	-	-
L-S	33	99	552	133	329	462	419	90
L-M	-	-	-	-	-	-	-	-
L-L	-	-	-	-	-	-	-	-
All	33	99	552	133	329	462	419	90

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 89. Estimated Production Costs and Returns for Peanuts by Resource Planning Unit, Farm Size and Coastal Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per Dunom) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
28-S	100	130	281	182	81	263	99	18
28-M	100	128	300	212	68	280	88	20
28-L	-	-	-	-	-	-	-	-
All	100	130	285	189	78	267	96	18
C-S	100	130	281	182	81	263	99	18
C-M	100	128	300	212	68	280	88	20
C-L	-	-	-	-	-	-	-	-
All	100	130	285	189	78	267	96	18

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 90. Estimated Production Costs and Returns for Peanuts by Resource Planning Unit, Farm Size, ~~and~~ Coastal Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/					
			Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
28-S	100	130	216	140	62	202	76	14
28-M	100	128	234	166	53	219	68	15
28-L	-	-	-	-	-	-	-	-
All	100	130	222	148	59	207	74	15
C-S	100	130	216	140	62	202	76	14
C-M	100	128	234	166	53	219	68	15
C-L	-	-	-	-	-	-	-	-
All	100	130	222	148	59	207	74	15

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 91. Estimated Production Costs and Returns for Peanuts by Resource Planning Unit, Farm Size, ~~and~~ Steppe Type of Farming Region, Cropyear 1977-1978, S.A.R.

			Production Costs and Returns (S.L. Per Dunom) 1/					
RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
1	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-
19-S	100	124	224	98	155	253	126	-29
19-M	100	320	480	200	200	400	280	80
19-L	-	-	-	-	-	-	-	-
All	100	174	289	124	166	290	165	- 1
21	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-
33	-	-	-	-	-	-	-	-
39	-	-	-	-	-	-	-	-
41	-	-	-	-	-	-	-	-
ST-S	100	124	224	98	155	253	126	-29
ST-M	100	320	480	200	200	400	280	80
ST-L	-	-	-	-	-	-	-	-
All	100	174	289	124	166	290	165	- 1

1/ Weighted by total number of dunoms
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 92. Estimated Production Costs and Returns for Peanuts by Resource Planning Unit, Farm Size, ~~and~~ Steppe Type of Farming Region, Cropyear 1977-1978, S.A.R.

RPU and Farm Size	Extent of Irrigation 2/ (Pct.)	Yield (Kg)/ Dunom	Production Costs and Returns (S.L. Per 100 Kg) 1/ Value of Production	Variable Cost	Value of Family Labor 3/	Total Cost	Gross Margin 4/	Net Earnings 5/
1	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-
19-S	-	-	-	-	-	-	-	-
19-M	100	124	181	79	125	204	102	-23
19-L	100	320	150	62	62	124	88	26
All	100	174	166	71	96	167	95	- 1
21	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-
33	-	-	-	-	-	-	-	-
39	-	-	-	-	-	-	-	-
41	-	-	-	-	-	-	-	-
ST-S	-	-	-	-	-	-	-	-
ST-M	100	124	181	79	125	204	102	-23
ST-L	100	320	150	62	62	124	88	26
All	100	174	166	71	96	167	95	- 1

1/ Weighted by total production
2/ Proportion of holders reporting
3/ Imputed value of unpaid family labor
4/ Value of production less variable cost
5/ Value of production less total cost

Appendix Table 93. Estimated Production Costs and Returns For Dry Onions By Resource Planning Unit and Region Cropyear 1977-1978, S.A.R.

RPU and Region	Extent of Irrigation 1/	Yield (Kg/ Dunom)	Production Costs and Returns: Value of Production	Variable Cost	Value of Family Labor 2/	Total Cost	Gross Margin 3/	Net Earnings 4/
			S.L. Per Dunoms 5/					
Coastal								
28	100	2478	1487	364	62	426	1123	1061
Lowlands								
34	100	1988	696	526	48	574	170	122
Steppe								
19	100	788	449	449	91	540	0	-91
41	100	1113	835	478	83	561	357	274
All	100	962	656	465	87	552	191	104

1/ Proportion of holders reporting
2/ Imputed value of unpaid family labor
3/ Value of production less variable cost
4/ Value of production less total cost
5/ Weighted by total number of dunoms

Appendix Table 94. Estimated Production Costs and Returns For Cucumbers By Resource Planning Unit and Region Cropyear 1977-1978, S.A.R.

RPU and Region	Extent of Irrigation 1/	Yield (Kg/ Dunom)	Production Costs and Returns					
			Value of Production	Variable Cost	Value of Family Labor 2/	Total Cost	Gross Margin 3/	Net Earnings 4/
			S.L. Per Dunoms 5/					
Coastal								
28	84	758	518	261	145	406	257	112
Undulating Plains								
38	0	225	153	30	67	97	123	56

1/ Proportion of holders reporting
2/ Imputed value of unpaid family labor
3/ Value of production less variable cost
4/ Value of production less total cost
5/ Weighted by total number of dunoms

Appendix Table 95. Estimated Production Costs and Returns For Tomatoes By Resource Planning Unit and Region Cropyear 1977-1978, S.A.R.

RPU and Region	Extent of Irrigation 1/	Yield (Kg/ Dunom)	Production Costs and Returns: Value of Production	Variable Cost	Value of Family Labor 2/	Total Cost	Gross Margin 3/	Net Earnings 4/
			S.L. Per Dunoms 5/					
Coastal								
28	75	1927	1155	441	250	691	714	464
Mountain								
29	0	131	52	52	141	193	0	-141
30	46	560	304	121	214	335	183	- 31
36	25	275	122	66	166	232	56	-110
All	38	474	249	104	200	304	145	- 55
Euph. & Tributaries								
32	100	1977	1180	395	617	1012	785	168
Southwest								
3	100	2818	1134	522	113	635	612	499
10	100	617	308	253	39	292	55	16
15	100	1310	641	149	112	261	492	380
All	100	2698	1092	497	112	609	595	483
Steppe								
19	100	734	325	315	22	337	10	-12
41	100	493	192	223	50	273	-31	-81
All	100	648	277	282	32	314	- 5	-37

1/ Proportion of holders reporting
2/ Imputed value of unpaid family labor
3/ Value of production less variable cost
4/ Value of production less total cost
5/ Weighted by total number of dunoms

Appendix Table 96. Estimated Production Costs and Returns For Potatoes By Resource Planning Unit and Region Cropyear 1977-1978, S.A.R.

RPU and Region	Extent of Irrigation 1/	Yield (Kg/ Dunom)	Production Costs and Returns						
			Value of Production	Variable Cost	Value of Family Labor 2/	Total Cost	Gross Margin 3/	Net Earnings 4/
			S.L. Per Dunoms 5/					
Mountain								
29	0	262	262	122	69	191	140	71
30	0	94	75	33	97	130	42	-55
All	0	113	96	43	94	137	53	-41
Lowlands								
34	100	363	230	464	81	545	-234	-315
35	100	670	560	535	162	697	25	-137
All	100	377	245	467	85	552	-222	-307
Undulating Plains								
23	100	609	435	340	62	402	95	33
Southwest								
9	100	205	236	366	52	418	-130	-182
16	65	952	1031	720	175	895	311	136

1/ Proportion of holders reporting
2/ Imputed value of unpaid family labor
3/ Value of production less variable cost
4/ Value of production less total cost
5/ Weighted by total number of dunoms

Appendix Table 97. Estimated Production Costs and Returns For Eggplants By Resource Planning Unit and Region Cropyear 1977-1978, S.A.R.

RPU and Region	Extent of Irrigation 1/	Yield (Kg/ Dunom)	Production Costs and Returns: Value of Production	Variable Cost	Value of Family Labor 2/	Total Cost	Gross Margin 3/	Net Earnings 4/
			S.L. Per Dunoms 5/					
Coastal								
28	100	1898	813	617	363	980	196	-167
Mountain								
30	100	1278	511	223	388	611	288	-100
36	100	490	147	105	74	179	42	- 32
All	100	997	381	181	276	457	200	- 76

1/ Proportion of holders reporting
2/ Imputed value of unpaid family labor
3/ Value of production less variable cost
4/ Value of production less total cost
5/ Weighted by total number of dunoms

Appendix Table 98. Estimated Production Costs and Returns For Water Melons By Resource Planning Unit and Region Cropyear 1977-1978, S.A.R.

RPU and Region	Extent of Irrigation 1/	Yield (Kg/ Dunom)	Production Costs and Returns					
			Value of Production	Variable Cost	Value of Family Labor 2/	Total Cost	Gross Margin 3/	Net Earnings 4/
			S.L. Per Dunoms 5/					
Mountain								
58	0	81	23	16	22	38	7	-15
Lowlands								
26	0	190	43	16	15	31	27	12
Undulating Plains								
38	0	292	57	21	7	28	36	29

1/ Proportion of holders reporting
2/ Imputed value of unpaid family labor
3/ Value of production less variable cost
4/ Value of production less total cost
5/ Weighted by total number of dunoms

Appendix Table 99. Estimated Production Costs and Returns For Grapes By Resource Planning Unit and Region Cropyear 1977-1978, S.A.R.

RPU and Region	Extent of Irrigation 1/	Yield (Kg/ Dunom)	Production Costs and Returns: Value of Production	Variable Cost	Value of Family Labor 2/	Total Cost	Gross Margin 3/	Net Earnings 4/
			S.L. Per Dunoms 5/					
Mountain								
29	0	13	8	28	9	37	-20	-29
30	0	108	11	40	63	103	31	-32
36	0	18	16	5	8	13	11	3
37	0	15	13	10	32	42	3	-29
All	0	38	28	11	19	30	16	-3
Undul. Pl.								
25	0	26	13	19	3	22	- 6	- 9
27	0	39	20	14	8	22	6	- 2
38	0	70	33	28	8	36	5	- 3
57	88	117	73	4	31	35	69	38
All	1	70	34	24	10	34	10	0
Southwest								
4	0	92	43	25	29	54	18	-11
9	0	210	181	10	40	50	171	131
15	0	231	194	31	35	66	163	128
All	0	223	187	27	36	63	160	124
Steppe								
13	5	413	459	75	103	178	384	281
17	100	248	261	305	101	406	-44	-145
All	26	365	401	142	102	244	259	157

1/ Proportion of holders reporting
2/ Imputed value of unpaid family labor
3/ Value of production less variable cost
4/ Value of production less total cost
5/ Weighted by total number of dunoms

Appendix Table 100. Estimated Production Costs and Returns For Olives By Resource Planning Unit and Region Cropyear 1977-1978, S.A.R.

RPU and Region	Extent of Irrigation 1/	Yield (Kg/ Dunom)	Production Costs and Returns					
			Value of Production	Variable Cost	Value of Family Labor 2/	Total Cost	Gross Margin 3/	Net Earnings 4/
			S.L. Per Dunoms 5/					
Coastal								
28	0	155	294	55	39	94	239	200
Mountain								
30	0	48	103	25	57	82	78	21
36	0	84	107	43	20	63	64	44
37	0	64	113	24	32	56	89	57
58	0	43	72	17	22	39	55	33
All	0	66	106	32	36	68	74	38
Lowlands								
26	0	90	220	50	0	50	170	170
34	0	90	0	19	0	19	-19	-19
35	100	35	81	59	0	59	22	22
47	0	362	331	44	17	61	287	270
All	35	234	233	49	10	59	184	174
Undulating Plains								
24	100	290	377	164	78	242	213	135
25	0	31	63	20	28	48	43	15
All	3	39	73	25	30	55	48	18

(Continued)

Appendix Table 100. (Cont) Estimated Production Costs and Returns For Olives
By Resource Planning Unit and Region
Cropyear 1977-1978, S.A.R.

RPU and Region	Extent of Irriga- tion 1/	Yield (Kg/ Dunom)	Production Costs and Returns					
			Value of Production	Variable Cost	Value of Family Labor 2/	Total Cost	Gross Margin 3/	Net Earnings 4/
			S.L. Per Dunoms 5/					
Southwest								
3	100	180	495	39	129	168	456	327
4	0	100	380	15	82	97	365	283
15	55	93	278	45	27	72	233	206
All	54	96	291	43	34	77	248	214

1/ Proportion of holders reporting
2/ Imputed value of unpaid family labor
3/ Value of production less variable cost
4/ Value of production less total cost
5/ Weighted by total number of dunoms

Appendix Table 101. Estimated Production Costs and Returns For Figs By Resource Planning Unit and Region Cropyear 1977-1978, S.A.R.

RPU and Region	Extent of Irrigation 1/	Yield (Kg/ Dunom)	Production Costs and Returns					
			Value of Production	Variable Cost	Value of Family Labor 2/	Total Cost	Gross Margin 3/	Net Earnings 4/
			S.L. Per Dunoms 5/					
Coastal								
28	100	134	134	42	12	54	92	80
Mountain								
29	0	66	33	35	54	89	- 2	-56
30	54	187	228	143	71	214	85	14
37	0	183	92	21	39	60	71	32
58	0	51	31	5	16	21	26	10
All	16	135	121	62	43	105	59	16
Undulating Plains								
25	0	163	138	101	44	145	37	- 7
Southwest								
4	0	50	58	8	38	46	50	12
9	0	51	51	8	25	33	43	18
15	0	197	189	39	54	93	150	96
All	0	181	175	36	52	88	139	87

1/ Proportion of holders reporting
2/ Imputed value of unpaid family labor
3/ Value of production less variable cost
4/ Value of production less total cost
5/ Weighted by total number of dunoms

Appendix Table 102. Estimated Production Costs and Returns For Apples
By Resource Planning Unit and Region
Cropyear 1977-1978, S.A.R.

RPU and Region	Extent of Irrigation 1/	Yield (Kg/ Dunom)	Production Costs and Returns					
			Value of Production	Variable Cost	Value of Family Labor 2/	Total Cost	Gross Margin 3/	Net Earnings 4/
			S.L. Per Dunoms 5/					
Southwest								
16	100	151	289	141	69	210	148	79

1/ Proportion of holders reporting
2/ Imputed value of unpaid family labor
3/ Value of production less variable cost
4/ Value of production less total cost
5/ Weighted by total number of dunoms

Appendix Table 103. Estimated Production Costs and Returns For Apricots
By Resource Planning Unit and Region
Cropyear 1977-1978, S.A.R.

RPU and Region	Extent of Irrigation 1/	Yield (Kg/ Dunom)	Production Costs and Returns					
			Value of Production	Variable Cost	Value of Family Labor 2/	Total Cost	Gross Margin 3/	Net Earnings 4/
			S.L. Per Dunoms 5/					
Mountain								
36	0	241	308	224	58	282	84	26
Southwest								
9	100	319	259	152	118	270	107	-11
15	100	285	194	56	64	120	138	74
All	100	310	242	126	104	230	116	12
Steppe								
13	100	391	241	112	92	204	129	37

1/ Proportion of holders reporting
2/ Imputed value of unpaid family labor
3/ Value of production less variable cost
4/ Value of production less total cost
5/ Weighted by total number of dunoms

Appendix Table 104. Estimated Production Costs and Returns For Lemons By Resource Planning Unit and Region Cropyear 1977-1978, S.A.R.

RPU and Region	Extent of Irrigation 1/	Yield (Kg/ Dunom)	Production Costs and Returns					
			Value of Production	Variable Cost	Value of Family Labor 2/	Total Cost	Gross Margin 3/	Net Earnings 4/
			S.L. Per Dunoms 5/					
Coastal								
28	0	571	571	339	143	482	232	89
Lowlands								
35	95	299	265	211	23	234	54	31

1/ Proportion of holders reporting
2/ Imputed value of unpaid family labor
3/ Value of production less variable cost
4/ Value of production less total cost
5/ Weighted by total number of dunoms

Appendix Table 105. Estimated Production Costs and Returns For Bitter Vetch By Resource Planning Unit and Region Cropyear 1977-1978, S.A.R.

RPU and Region	Extent of Irrigation 1/	Yield (Kg/ Dunom)	Production Costs and Returns					
			Value of Production	Variable Cost	Value of Family Labor 2/	Total Cost	Gross Margin 3/	Net Earnings 4/
			S.L. Per Dunoms 5/					
Undulating Plains								
25	0	61	30	33	42	75	- 3	-45
Southwest								
2	0	18	13	36	8	44	-23	-31
5	0	47	44	27	39	66	17	-22
15	0	66	66	37	66	103	29	-37
All	0	37	34	34	30	64	0	-30
Steppe								
13	0	33	41	8	25	33	33	8

1/ Proportion of holders reporting
2/ Imputed value of unpaid family labor
3/ Value of production less variable cost
4/ Value of production less total cost
5/ Weighted by total number of dunoms

Appendix Table 106. Estimated Production Costs and Returns For Sesame By Resource Planning Unit and Region Cropyear 1977-1978, S.A.R.

RPU and Region	Extent of Irrigation 1/	Yield (Kg/ Dunom)	Production Costs and Returns					
			Value of Production	Variable Cost	Value of Family Labor 2/	Total Cost	Gross Margin 3/	Net Earnings 4/
			S.L. Per Dunoms 5/					
Mountain								
30	75	48	187	29	47	76	158	111
37	0	47	197	40	50	90	157	107
All	48	48	190	32	48	80	158	110
Euph. & Tributaries								
32	100	51	205	37	32	69	168	136

1/ Proportion of holders reporting
2/ Imputed value of unpaid family labor
3/ Value of production less variable cost
4/ Value of production le ss total cost
5/ Weighted by total number of dunoms

Appendix Table 107. Estimated Production Costs and Returns For Maize
By Resource Planning Unit and Region
Cropyear 1977-1978, S.A.R.

RPU and Region	Extent of Irrigation 1/	Yield (Kg/ Dunom)	Production Costs and Returns: Value of Production	Variable Cost	Value of Family Labor 2/	Total Cost	Gross Margin 3/	Net Earnings 4/
			S.L. Per Dunoms 5/					
Lowlands								
34	100	201	160	122	70	192	38	-32
Southwest								
3	100	150	122	16	76	92	106	30
9	100	99	80	81	16	97	- 1	-17
All	100	137	11	32	61	93	79	18
Steppe								
19	100	94	102	43	136	179	59	-77

1/ Proportion of holders reporting
2/ Imputed value of unpaid family labor
3/ Value of production less variable cost
4/ Value production less total cost
5/ Weighted by total number of dunoms